Archive

The Subscription Magazine for Archimedes Users

MARCH '94

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16-bit DTP Digital Audio – Part 1

Fortran on the Archimedes

Archive Open Day Details

Relational Database Design – Part 2

Acorn User Spring Show '94

PCB Layout Software

Reviews: ArcSimp, OakPCB, OakLogic, WordWorks, Desktop Thesaurus, Keyboard Options, TechWriter Update.

ncs

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Whither Acorn? – Part 16

I can't remember quite how many times we have returned to the "Whither Acorn?" saga – so I guessed that we were up to Part 16! Gabriel Swords, in our Comment Column on page 24 has added his two penny-worth and I have to admit that a month or so ago, I was getting a bit depressed at the way things were (or weren't) going. I could see Macs and PCs snapping at Acorn's (educational) heels and I was beginning to panic because, unlike a number of other companies, we have refused to diversify onto other platforms.

BETT '94 was a turning point in my feelings about Acorn's future. Apple had no new machines to offer and the amount of Mac and PC educational software was rather less than I had feared. Acorn, on the other hand, were continuing to drop hints of new technology and the amount of new Acorn hardware and software being launched was staggering. (The Products Available section occupies **eleven** pages!) All I hope is that Mike Williams' prediction in Risc User of "towards the middle of the year" is more accurate than my guess of "maybe not even until Acorn World 94" for the launch of the new machines.

NCS / Archive Open Day – March 12th

A total of 27 Acorn-related companies will be displaying their wares at our Open Day in March. It promises to be an exciting event so I hope a good number of Archive subscribers will be able to come. I'm sure it will be enjoyable from both a technical and a social point of view. For more details, see page 17.

Growth in Archive?

This issue of Archive has been extremely difficult to put together because of the huge amount of material. There is more advertising than usual and a lot of good technical articles. Thanks to all those who have responded to our request for more technical material and please be patient if yours hasn't yet been published. There's over 25 pages left for next month. But don't let that stop you if you have something to contribute – the more material we have, the more valuable Archive will be to its readers.

Suddenly, I'm really looking forward to '94! I hope you are too.

Paul Beverley

Government Health Warning – Reading this could seriously affect your spiritual health.

One of the readers of this God-slot said to me that the church was dead on its feet. I responded by pointing out that the Christian church is growing at a staggering rate in many parts of the world (e.g. Korea, China and many parts of S.America and Africa). His first response was to note that the growth was mainly in third world countries and to wonder whether this was because of the limited development of intellectual thought in those countries. *(Before reading on, think about that statement. Do you think it is true?)*

That view is actually very prevalent – i.e. now that we have 'come of age', intellectually, we have no need for Christian (or any other) God-myths. My two counter arguments to that are: (1) We may have come of age intellectually, but have we, in the UK, come of age morally? (Think about family breakdown, drug addiction, homelessness, etc before you answer.) (2) Why is there so much interest in spiritualism, New Age, Eastern religions, etc? There is an aching void in people's lives that they try to fill by pursuits of one kind or another.

Just suppose for a moment that God *does* exist and that Jesus really *is* who he said he was. If you were God, how would you react to people who refused even to *listen* to what you were trying to say? In John 3 verse 36, Jesus says, 'Whoever believes in the Son has eternal life, but whoever rejects the Son will not see life, for God's wrath remains on him.' God is just and will not condemn us for *ignorance* but if we have the opportunity to consider Jesus' claims, it's worth checking them out before we reject them as only for those of 'limited intellectual development'.

P.B.

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Products Available

A lot of the new products available this month have an education bias. This reflects the large amount of new software and hardware on show at BETT '94. However, there are a tremendous number of products of more general application, so even non-education readers will find it worth wading through the whole ***eleven*** *pages!*

• **Acorn Access** is an important new AUN networking product. It is described as an "entry-level plug and play" networking product. If you have Acorn computers (RISC OS 3.1 with 2Mb+) in reasonably close proximity, you can buy an Access Pack for each one, connect them together and you will be able to share hard disc and printer facilities between the computers. Each pack consists of an Ethernet card plus appropriate drop-leads, T-connectors and thru-connectors to link the computers together, and the Access software. This allows you to export hard discs and printers so that they can be accessed by other computers on the network. It requires no fileserver software or hardware and therefore has no management overheads – no special knowledge is needed to run it – indeed the installation 'manual' is a single A4 sheet and the operating instructions are on another A4 sheet. However, you can link it into an existing Level4 fileserver if you want to do so.

This is an extremely easy system to set up allowing up to about twenty machines to be linked together over a distance of up to 185m. Acorn recommend sharing one hard disc between about five or six machines and it is possible, say, to share three or four hard discs between fifteen machines on the same network segment. The hard discs can be shared on the basis of 'protected' or 'unprotected', i.e. read-only or read/write so you can prevent things being deleted if you choose! The schools that have acted as test sites for Access have been extremely pleased with it, particularly it terms of easy of installation and easy of use.

We haven't got any pricing information at present but if it arrives in time, we will put it in the Members' Price List.

• **AUN Fileserver Level 4 release 3** is now available. This includes Application Accelerator (see above) and !Gateway which enables two-way access between two Ethernet networks of between two different cabling systems such as Ethernet and Econet. Again, we are still waiting for confirmation of pricing but I guess that the price will probably stay at £399 +VAT or £430 through Archive. The upgrade for release 1 or 2 to release 3 is 'hoped to be about £100'.

• **Application Accelerator** is another new AUN networking product from Acorn. It is an application server which allows applications to be made available to client machines on a read-only basis about four times as fast as through the Level 4 Fileserver. However, Accelerator can export any accessible directory or filing system and is not just limited to a fileserver. For example, if it is put on an AUN gateway machine, it can make a shared filing system accessible from both sides of the gateway. If you have an application server using NFSFiler (from TCP/IP), you can make this available to clients without them having to use NFSFiler. Accelerator is compatible with TCP/IP (release 2) and Level 4 Fileserver (release 3).

• **ArcFS2** – This is now being distributed by Vertical Twist and the price has been increased to £24.99 inc VAT or £23 through Archive.

• **ArcSimp III** – Mijas Software have now released version 3 of their RISC OS compliant electronic simulation package. Its facilities include digital circuit simulation, analogue circuit simulation, control system design and mechanical system simulation. It comes in two forms: a National Curriculum study version at £55 +VAT (site licence £150) and a Professional Design & Research version costing £105 +VAT (site licence £300).

• **ArtWorks 1.5** – This new version of ArtWorks provides support for 24-bit sprites. It includes new TIFF file loaders and a fast-load feature. The price remains at £169 +VAT from Computer Concepts or £180 through Archive.

• **ArtWorks 1.5 on CD** – This includes all of the clipart from the Clipart CD, the new version of ArtWorks plus all the ArtWorks fonts. The price remains at £169 +VAT from Computer Concepts or £180 through Archive.

• **ArtWorks Clipart CD** – Computer Concepts are selling a CD which consists of an ArtWorks file viewer plus over 800 ArtWorks example pictures. It also has a demo version of AudioWorks with example audio files and dozens of 24-bit photographs. The ArtWorks Clipart CD costs £19 from Computer Concepts or £21 through Archive. (The clipart on this CD is the same as is included on the CD version of ArtWorks.)

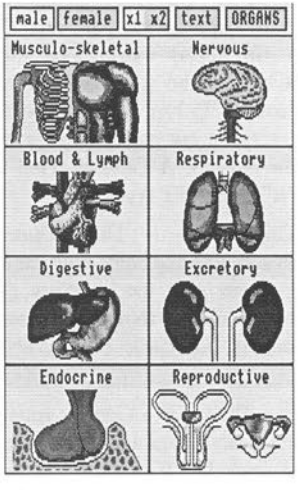
• **ArtWorks Made Easy** by Ann Rooney is published by Dabs Press. As the title suggests, this is aimed at the Artworks beginner and takes the reader step by step through its various features and draws attention to the principal differences between Artworks and Draw. Artworks Made Easy costs £14.95 from Dabs Press or £15 through Archive inclusive of p&p. (Books, being heavy are expensive to post.)

• **Basic WIMP Programming** is a new book by Alan Senior published by Dabs Press. It enables you to learn how to program the WIMP environment using Basic. To assist program development, the book gives many example programs which are designed to be easily adapted and expanded for your own applications. An extensive library of procedures and functions is also provided to simplify the program writer's task. The price of £16.95 includes a disc of programs, procedures and functions. This is available through Archive for £17 inclusive of p&p.

• **BearSheet** is a "simple yet sophisticated" spreadsheet from ERIC (Education Resources in Computing). It consists of two spreadsheet programs aimed at different educational levels, does bar and pie charts, line and scatter graphs and costs £29.95 inc VAT from ERIC with a network version at £59.90 inc VAT.

• **BearWords** is a wordprocessor/DTP package also from ERIC consisting of three separate WPs at different levels from elementary to advanced level. It is also concept keyboard compatible. BearWords costs £42.95 inc VAT from ERIC and a network version is available from them at £85.90 inc VAT.

• **Bodywise** is an animated database of the human body from Sherston Software. It provides an exploration of the human body for top juniors and lower secondary pupils – just point and click the body-part they want to know about and watch it work! *(The mind boggles! Ed)* There is a setup option which allows teachers to choose which systems are available to the children and to turn on or off the explanations and animations of the sexual organs. Bodywise is fully RISC OS compliant and all illustrations and text can easily be saved or transferred to other applications. The package comes with user manual, a booklet of ideas for classroom use, two sets of Body Search cards and a set of study sheets. Bodywise costs £39.95 +VAT from Sherston Software or £44 through Archive.



• **Brilliant special needs software** – Brilliant Computing have produced some more software for special needs children.

FacePaint allows the children (or you!) to create hundreds of silly faces with different noses, eyes, ears, hair, hats, etc. Fill in a 'features chart' from an eye-witness report and then create your own identikit picture. FacePaint is £30 +VAT from Brilliant Computing.

Look & Listen consists of five mini video games to develop basic road safety skills. It uses the stereo sound and comes with a free pair of headphones. It can be used with mouse, keyboard, touch screens or

simple switch. Look & Listen costs £25 +VAT from Brilliant Computing.

Sound Stuff consists of five games using a library of 24 sounds and matching pictures. Find the sound to match the picture, use the stereo facility to find where the sound is coming from, or play the matching pairs game. It uses real recorded speech and can be used with mouse or touch screen and comes with a free pair of headphones. Sound Stuff costs £25 +VAT from Brilliant Computing.

• **CD-Net** is a CD-ROM filing system for AUN. The idea of it is to overcome some of the limitations imposed by existing hardware and software. It allows CD-ROMs to be accessed either by special retrieval software designed for a particular CD-ROM or through a CDFiler. CD-Net is designed in such a way that, with "appropriate hardware", it is even possible to run Replay movies over the network. CD-ROMs have to be specifically licensed to be accessed through CD-Net. There are currently eight titles being licensed but more will be available over the next few months. A CD-Net Trial Pack costs £39.95 +VAT from PEP Associates.

• **Celtic Clipart disc** – This includes borders, panels, chains, motifs and some hints on altering the graphics for your own use. It costs £10.99 (no VAT) and is available from: Glyn Howells, Sicar Uchaf, Brongest, Newcastle Emlyn, Dyfed, SA38 9ET.

• **Cistercian Abbeys** is a Genesis application that uses graphics, plans, maps and a database to explore medieval monastic life. Cistercian Abbeys costs £45 +VAT from Oak Solutions or £50 through Archive.

• **Clipart & educational resource files** – a range of clipart and educational resource files are available from DEC_dATA at prices ranging from £3 to £13 +VAT per set. New ones include **Famous Buildings, Hand Tools and Military Aircraft** each £7.95 +VAT and **The Party, Wedding and Anniversary Collection**, a two-disc set at £14 +VAT. There is also an **Impression Style Resource Disc** at £7.95 +VAT which includes borders, decorative drawfiles, map of the UK, masks, office symbols and sport pictures and an **Artworks Resource Disc** at £8.95 +VAT which includes decorative motifs, moulds for the envelope tool, drawings of gears and stars, moulds for the perspective tool and a good number of sample files.

• **Colour Hand Scanner** – We now have information on Irlam's hand scanner as mentioned briefly in Products Available last month. This is an A5 scanner producing 24-bit colour output or 256 grey levels. Resolution is from 100 to 400 dpi. The scan area is selectable up to just over 4 inches (about 10.5 cm). It has monochrome, 16 grey, 256 grey and 256 colour sprite support. The 24-bit formats include Clear files and compressed JPEG. Brightness adjustment is done by control on the scan head and gamma correction and sharpness are adjustable in software. A version that will work in A3000/3010/3020/4000 machines is in the pipeline but, at the moment, you need a computer that will take a standard podules. The Irlam 24-bit Colour HandScanner costs £359 +VAT +carriage from Irlam or £425 through Archive.

We had a look at this scanner at the BETT Show and it is VERY impressive. The output has to be seen to be believed. We have put a few sample scans on this month's program disc.

• **Colour scanner correction** – When I mentioned Irlam's Proi-Mage software and Epson scanners, I misquoted the scanning resolution. The Epson GT-6500 (£1000 inc VAT through Archive) actually scans at 600d.p.i. and is even capable of going to 1200d.p.i. while the Epson GT-8000 (£1,380 through Archive) scans at 800d.p.i. and is capable of going up to 1600d.p.i.!

• **Conjugez!** – This is a software tool from Creative Curriculum Software for helping you learn French verbs and is applicable right from early learners of French up to A level and beyond. Conjugez! has 3,500 verbs built into sets of data files in a range of nine appropriate levels. The education site licence version also has a utility for adding more verbs and editing the existing datafiles. Conjugez! is £24.95 +VAT for a single user or £89 +VAT for a site licence from Creative Curriculum Software.

• **Cumana CD-ROM price increases** – There have been various price rises on CD-ROMs. The new Archive prices are as follows:

Creepy Crawlies – £100
Dictionary of the Living World – £175

Grooves – £25
Image Warehouse – £59
All four of the above – £180†
Space Encyclopedia – £44
World of Number
Number Games & Short Tasks – £89
Perspectives – £89
Picture Gallery – £89
Who Stole the Decimal Point? – £89

†Yes, I know that's only £5 more than Dictionary of the Living World on its own but they say it's a special offer price, so who are we to argue!

• **Cycloids** – GamesWare have taken over this Software 42 game. The plot features a unicycle-riding clown whose job it is to save the world! It features 256-colour cartoon graphics and comical sound effects. Cycloids costs £19.99 from Gamesware or £19 through Archive.

• **Desktop Screenturtle** – Topologika have produced a desktop version of their easy-to-learn turtle graphics program. It offers a range of Logo features but always with the aim of making it accessible for the younger users – aimed at 8 to 13+ year olds. The new version has 'many new features' including a toolbox plus drag and drop loading of screens and word sets. You can also switch off the need for numbers after commands. This 'no numbers' input mode works in conjunction with scaling options for distance and direction and means that younger children needn't worry about numbers bigger than 10. Desktop Screenturtle costs £45 +VAT or £49 through Archive. An upgrade from the original version is available at £10 +VAT from Topologika.

• **DrawPlot upgrade** – Oak Solutions have upgraded DrawPlot, their HPGL compatible plotter utility which works, for example, on the Roland CAMM series. It now supports Graphtec plotters and work is under way on Plotmate A3M and A4M plotters. DrawPlot allows you, simply and quickly, to plot, cut or engrave drawings from drawfiles. CAMM1 cutters and CAMM2 millers can be driven in the same way as an HPGL plotter and DrawPlot can be used, for example, to produce vinyl signs.

DrawPlot is part of their Draw Print & Plot package, which costs £30 +VAT from Oak Solutions or £33 through Archive.

• **Eagle M2** – The Eagle M2 multimedia card provides 12-bit stereo sampling and playback at CD rate (44.1kHz), full Midi capability, 24-bit colour and greyscale still frame digitising, Acorn Replay movie capture and Eidos real-time movie capture. It has S-VHS and composite video input, line level audio input and output as well as audio out through the computer speaker or headphone socket. This is an impressive array of facilities to have on a single-width podule and the price is impressive too: £299 + p&p +VAT (£358.37) from Wild Vision or £340 through Archive. It needs 4Mb and RISC OS 3.1 and, for Replay movie capture, an A5000 or A540 with at least 4Mb is recommended.

David Lenthall has started a series about audio sampling (see page 43) – and he will be mentioning this and other offerings on the Acorn audio front next month. Ed.

• **Exploring Nature** is a CD-ROM version of Usborne's First Book of Nature. It is targeted at primary and early secondary and aims to keep up the Usborne tradition of "a very colourful presentation style with hundreds of beautifully drawn pictures". The basic approach is to let children emulate the process of scientific discovery by doing a simulated field trip on which they "measure" such things as temperature and sunlight, and collect or "photograph" things they find. They can then study from themed books or look up references in a nature dictionary. From their collected information, the children can write up a report or transfer pictures and data to other applications to collate it further or make a special presentation of their work. Exploring Nature comes with a teacher's pack providing explanatory notes, user guide and National Curriculum linkages. Exploring Nature costs £120 +VAT from Hampshire Microtechnology Centre.

• **Fortran 77** – Intelligent Interfaces distribute a Fortran 77 compiler and a desktop front-end for Fortran 77. The compiler itself is supplied with linker, symbolic debugger (ASD) and utility library and costs £99 +VAT or £110 through Archive. The front-end, !Fortran77, enables Fortran programs to be compiled, linked and executed in the RISC OS desktop environment. It is supplied with DrawF, Graphics, SpriteOp, Utils and Wimp libraries and costs £25 +VAT or £28 through Archive.

The compiler was originally distributed by Acorn as the Acornsoft Fortran 77, release 2, compiler but Intelligent Interfaces have made a number of changes: the compiler can now be installed anywhere in the user's directory structure, the User Guide has been completely re-written, a Utility Library is included, the symbolic debugger (previously distributed with the Acorn Software Developer's Toolbox) is included with its own user guide, a command to compile and link in a single operation has been added and instructions on how to use the linker in Acorn's DDE are given.

• **Fonts (low cost) 1** – Tekoa Graphics have produced their first pack of low-cost fonts. They are offering 25 outline fonts for under £1 a font. They are suitable for use with RISC OS 2 and 3 although they do not contain any auto-kerning data. The fonts (including the number in each family) are as follows: Academy (2), Bengal (4), Bookmark (4), Chaucer (medium italic only), Garland (4), Matrix (a fancy font), Moscow (a Cyrillic font), Optimist (4) and Paladin (4). They are mainly serifed fonts and are "mostly inspired by (but slightly different from) industry-standard typefaces". Fonts Pack One costs £20 +£2.75 p&p from Tekoa Graphics (no VAT as not registered). (See Richard Hallas' review next month – it wouldn't fit in this month.)

• **Fonts (low cost) 2** – The Datafile have renegotiated their licence agreement with ITC of New York and URW of Hamburg. The result is (a) lower prices for professional fonts and (b) a Pick 'n Mix service so that you can buy just the fonts you want from a list of 33 families, totalling 100 weights. The fonts seem to be of very high quality. (See Richard Hallas' review next month.) For more details, contact The Datafile or see the advert on page 20.

• **F.R.E.D.** – The 3D adventure game which was reviewed in Archive 7.1 p24, is now available through Archive at £19.

• **Go-Go!** – This is a simple turtle graphics program from NW SEMERC for teaching number, geometry and logic to special needs, primary and secondary pupils. This is a full RISC OS multitasking package providing a range of activities whose simplicity or complexity can be set by the teacher. It includes a wide variety of ready-made scenes and pointers to which the pupil must give instructions in order to move it around the screen to a particular goal. Reward sounds can be programmed to play when a particular task is completed. A map, ordnance survey symbols and an on-screen ruler and protractor are provided for taking accurate measurements. The price of the two-disc set for Go-Go!, including a curriculum guide with more ideas, is £40 +£3 p&p +VAT from NW SEMERC.

• **Granny's Garden** CD-ROM! Cumana and 4Mation have combined to produce a new multimedia version of this popular educational program. The CD-ROM version has enhanced graphics so that you can take advantage of higher screen resolutions if they are available. It also has music and sound effects together with a narrated introduction to the story by 4Mation's own Mike Matson. It costs £29.95 +VAT or £33 through Archive.

• **Hard drive price drops** – The prices of Mac hard drives (which work well on Acorn using most of the SCSI cards currently available) have dropped recently. The price drops are as follows:

170Mb internal £310 → £260
170Mb external £440 → £390
525Mb internal £790 → £580
525Mb external £910 → £710
1Gb internal £1040 → £850
1Gb external £1170 → £980

We also have a new drive: a 2Gb external at £1390.

Remember though that with Acorn's existing range of Archimedes computers, the maximum amount of memory that can be handled as a single logical drive is 512Mb, so the 1Gb would have to be partitioned as two 512Mb drives and the 2Gb drive would take up all four drives possible on a SCSI interface, leaving no room for a SCSI-type backup device!

(It would be a reasonable guess that these bigger drives will be more easily handled on any new range of machines that Acorn might launch in the future. Ed.)

A suitable SCSI interface would be a Morley uncached SCSI card (£160) for the 170Mb drive and a cached SCSI card (£220) for the larger drives. Below about 200Mb, the cache does not make a lot of difference to the speed.

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The BJ-230 is a black and white inkjet printer from Canon that handles a variety of paper sizes up to A3. It comes with a built-in 80 page sheet feeder and power supply. With a print density of 360dpi the print quality is hard to distinguish from a laser printer and better than any other competing black and white inkjet printer. A sample A4 print out is available on request so you can make the comparison. And like all inkjet printers the BJ-230 is whisper quiet and both easy and cheap to maintain.

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The A4 BJ-200:
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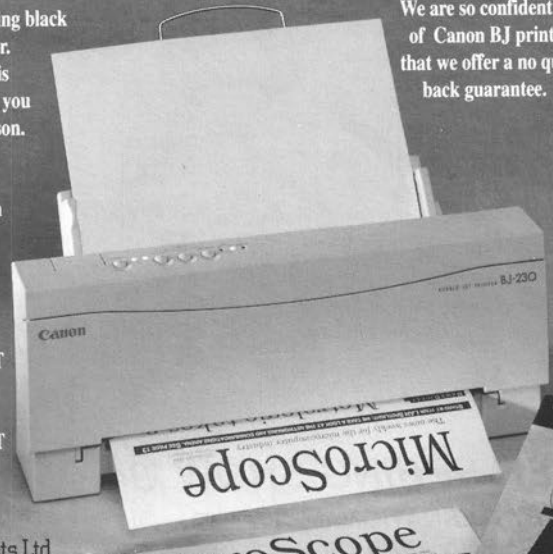
The BJ-230 and RISC OS 3 Turbo DRIVERS

The BJ-230 is supplied with Computer Concepts' super-fast TurboDriver printer drivers - printing and returning control on average between three and ten times faster than the standard Acorn drivers or the Ace PROdrivers. The RISC OS 3 TurboDriver works with !Printers, which means for example that it can handle rotated text and sprite printing. If also offers full Postscript style control over screen density, screen angle and screen type to achieve the best possible print quality.

We are so confident about our combination of Canon BJ printers with TurboDrivers that we offer a no quibble, money back guarantee.

The BJ-230 is only suitable for use with RISC OS 3.1. Suitable for all models of Archimedes, but a minimum of 2 Mbytes of RAM is required.



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E&OE Prices & descriptions are subject to change.

• **Hawk V9 MkII** – Wild Vision's Hawk colour digitiser used to be available in two forms: standard and "hardware dithered" but the standard version has now been deleted and the hardware dithered version has been reduced from £269 to £199. This version allows you to have a live display window in the desktop where the grabbed video picture is displayed with full dithered colours. It also has a special mono format useful for preparing material for monochrome DTP work. It comes with fully RISC OS compliant software providing an "extensive range of image scaling and enhancing options" allowing sprites produced to be dragged straight into whatever desktop applications you are using. The price is now £199 +£6 carriage +VAT from Wild Vision or £229 through Archive.

• **Help for dyslexics** – A new book has been published which has been sponsored by Acorn Computers and the British Dyslexia Foundation. Computers and Dyslexia is edited by Dr Chris Singleton and aims to give an overview of the best in current technology and educational practice of help to those suffering from dyslexia which apparently affects about 4% of the population. Computers and Dyslexia is published by the Dyslexia Computer Resource Centre, University of Hull, Hull, HU6 7RX. 200pages, price £10.95, ISBN 1 898862 00 1.

• **High-density floppy disc interface** – At last, owners of A310/4x0/540 computers can use 1.6Mb floppies and be compatible with the newer machines. Risc Developments have produced an interface plus software to allow you to interface to a high-density floppy drive and use F-format Acorn floppies as well as 1.44Mb and 1.2Mb PC formats. You can buy it with or without an HD drive unit and it has a set of link jumpers allowing configuration for operation with a wide range of drive types. It costs £119 +VAT for the interface or £159 +VAT for the interface plus an HD floppy drive. For A310 to fit one of these drives internally, there is a special fascia plate costing an extra £30 +VAT.

• **ImageBank** from Irlam Instruments is a way of getting 10Mbytes of colour scans onto a single floppy! It uses standard JPEG image compression to allow 8-bit and 24-bit images to be archived. One major advantage of it is that it provides the user with a thumbnail sketch of each picture in a directory-type display so that you can easily select the image you want. This can then be decompressed by double-clicking on it. Images can be exported in JPEG, 24-bit Clear file, 256 colour sprite or the new 15 and 32-bits per pixel sprites. A cut-down version is also supplied so that your images can be distributed/sold or shown as examples to other people. The complete package including the full and the cut-down versions of ImageBank costs £25 +VAT from Irlam Instruments or £28 through Archive.

(This month's program disc contains some colour scans from Irlam's new hand colour scanner presented via the ImageBank reader software.)

• **Impression Style** is CC's exciting new WP/DTP package. For £99 +VAT, you get facilities which are comparable with Impression II and many of the facilities are in fact superior to the older (more expensive) package. We hope to have a review of Impression Style before too long but suffice it to say that its features include: integrated thesaurus and dictionary, auto-section and paragraph bulleting, numbering and re-numbering, full support for 24-bit images, graphics filter with TIFF loaders, new interactive text ruler system and styles. Impression Style costs £107 through Archive.

Impression upgrades: Impression Junior and Impression II owners can upgrade to Style for £29 +VAT through Computer Concepts. Then when Impression Publisher is released, Impression Style owners and Impression II owners will be able to upgrade for £29 +VAT, again through Computer Concepts. (Many people feel that the extra facilities of Style make it worth upgrading once from II to Style and then again from Style to Publisher. Ed.)

• **Inkjet Refills** – For some time now, we have been intending to "go green"(!) by stocking inkjet refills. We have now arranged a deal with Quill Marketing in Norwich to stock InkMun refills which seem to have a good reputation for quality and reliability. (However, if you try them, perhaps you would report back so that we can check that they really are as good as they seem.)

The cost savings involved are quite marked. For example, buying HP black cartridges at £21 each would give you the same amount of ink as a pack of two refills costing only £15. Prices are as follows:

Hewlett Packard 500/510/500C/550C/310 (and JP150)
Black standard – 2 refills – £15
Black high capacity – 2 refills – £20
Cyan standard – 2 refills – £15
Magenta standard – 2 refills – £15
Yellow standard – 2 refills – £15
Triple colour 9 refills (3 each colour) – £30

Canon BJ10
Black – 2 refills – £15
Cyan – 2 refills – £15
Magenta – 2 refills – £15
Yellow – 2 refills – £15

Canon BJ200
Black – 2 refills – £15
Cyan – 2 refills – £15
Magenta – 2 refills – £15
Yellow – 2 refills – £15

Canon BJC600
Black – 3 refills – £15
Triple colour 9 refills (3 each colour) – £30

Canon BJC800
Black – 2 refills – £21
Cyan – 2 refills – £21
Magenta – 2 refills – £21
Yellow – 2 refills – £21

I think these are likely to be the most popular ones which is why we have been able to work out special prices on them. If you have other printers for which you want refills, let us know and tell us the sorts of quantities you are likely to want during the course of a year, say, and we'll see what we can work out with Quill Marketing.

• **IT in the Real World** is a Genesis application that looks at the applications and effects of IT in real life. It is aimed at Key Stage 3 and relates to IT capability levels 3 to 8. The IT in the Real World pack includes information and worksheets and costs £30 +VAT from Oak Solutions or £33 through Archive.

• **Ixion** – The 3D adventure game (see review on page 32 last month) is now available through Archive at £19.

• **Keyboards** – If your keyboard is beginning to get a bit unreliable or if you just want something of better quality (and cheaper!) than the Acorn replacement keyboards then Castle Technology's Ergo-Keyboards seem a good bet (see Brian Cowan's review on page 49). These keyboards are compatible with the Acorn keyboard, including the mouse socket and the reset button. They have industry standard 102 key PC layout and hardware keyboard mouse emulation. (We also suspect that any new Acorn computers will have standard PC keyboards, so you can get used to the slightly different PC layout ready for the new machines!) The price is £99 + £10 carriage +VAT (£128.08) direct from Castle Technology or £120 through Archive.

(Because Brian's review was so positive, we reckoned there would be a good number of people wanting to try these new keyboards so we have arranged a special bulk purchase with Castle Technology and can offer them at the introductory price of £105 inclusive – 18% discount. To take advantage of this special price, please place your order a.s.a.p. Thanks.)

• **Keyboards for A3000** – If your A3000 keyboard is beginning to get a bit unreliable Castle Technology's Ergo-Keyboards can now be attached to an A3000. The price of the A3000 Ergo-Keyboard, including interface, is £129 + £10 carriage +VAT (£163.33) direct from Castle Technology or £155 through Archive.

(We have arranged a bulk purchase of these keyboards and can offer them at the introductory price of £135 inclusive – 18% discount. To take advantage of this special price, please place your order a.s.a.p. Thanks.)

• **Langdale** is described by Creative Curriculum Software as "a massive resource of materials to Key Stage 3 geography". It provides OS maps, diagrams, aerial and ground photographs, data, statistics, charts and sounds all relating to Langdale in the Lake District. It consists of eight applications on CD-ROM for £149 +VAT including a site licence. Two of the applications, Stickle Project and River Project are available as separate stand-alone applications on disc for £89 +VAT each for those not having access to CD-ROM. Each price includes manual and teaching materials as well as the CD-ROM or discs.

• **Laser printers** – At the suggestion of Andrew Rawnsley last month (page 23) we have worked out

a 'cheap' alternative to Laser Direct HiRes 4 (Archive price £925). If you get a 'cheap' Laserjet-compatible laser printer and buy the CC HP TurboDriver (£53 through Archive) you don't need to pay as much as £925. It won't be as fast but if you want the quality of output that a laser offers, it's a way of doing so for a lower price. You can, of course, get a copy of Computer Shopper, or whatever, and find the cheapest Laserjet-compatible available but if you want a 'good name' printer to get the reliability then we would be happy to supply either the Epson EPL-5000 at £630 (£680 with TurboDriver) or the Panasonic KX-P4410 at £560 (£610 with TurboDriver). These prices are inclusive of VAT and carriage. They both have 0.5Mb RAM (expandable), will cope with envelopes and thin card and have paper trays taking 150 and 100 sheets respectively and run at 6ppm and 5ppm respectively.

(Readers have suggested other laser printers that they have used: Dave Walsh uses an Oki400e and, with only 0.5Mb RAM, it seems to cope with all but the most complex drawfiles. It has a straight paper path to take heavier paper and envelopes, gives good quality output and is reasonably cheap to run.)

• **Lemmings II – The Tribes** – Krisalis' latest Lemmings extravaganza is now available. It is truly amazing what they can get those tiny little animals to do! There is now a huge range of new and exciting Lemmings types to try out and many new levels to test your ingenuity and stretch your patience. Lemmings II is £29.99 from Krisalis or £28 through Archive.

• **Little Smalltalk** – A full-blown Smalltalk environment would cost over £500 but if you want just to experiment with the concepts of object-oriented programming, David Pilling's Little Smalltalk (as mentioned in Acorn User February 1994) is a good start. Little Smalltalk costs £5.99 from David Pilling or £6 through Archive inc p&p.

• **Maths Card** – To help with the teaching of maths at Key Stages 1 & 2, Creative Curriculum Software have produced Maths Card. Its aim is to help you produce well laid out maths question sheets quickly and easily as drawfiles ready for printing. It allows you to set up questions on addition, subtraction, multiplication and division while controlling things such as the occurrence of carrying figures, sign left or right, etc. It also covers decimals, fractions, weight and length, and allows the use of magic squares using Units to HTU. Maths Card costs £49 +VAT from Creative Curriculum Software.

• **MidiMax** is Wild Vision's Acorn-compatible Midi card. It has on-board FIFO buffering to allow reliable operation at maximum data rates. The standard Midi In, Out and Thru connectors are provided as well as a second Out connector to ease the interfacing of multiple devices. MidiMax costs £69 +p&p +VAT (£88.12) from Wild Vision or £83 through Archive.

• **My World 2 + 2** – NW SEMERC have produced a large pack of resources based on their framework package, My World 2. Originally designed with special needs in mind, My World 2 + 2 can be used by "people of all ages and abilities across many fields of learning and recreation". It provides four discs of resources including alphabet jigsaws, an easy writing screen, sentence building, picture building activities, kitchen planning, pattern-making from shapes, DIY dinosaurs, solitaire, draughts, town planning, pattern making, weather maps and charts. My World 2 + 2 costs £39 +£3 p&p +VAT from NW SEMERC.

• **Oak Recorder II** – This product has now been taken over from Oak Solutions by Solent Computer Products Ltd and sells at £39.95 +VAT.

• **Oak Solutions price drops** – A large number of Oak Solutions' software products have been reduced in price (since they moved into their new premises – address in Factfile at the back of the magazine). The new Archive prices are as follows:

Arclight – £50
Euclid – £55
Splice – £33
Tween – £33

Ancient Egypt – £50
Castle Life – £50
Saxon Life – £50

WorraCAD – £77
KiddiCAD – £50

ClassPrint LD – £77

ABC Compiler – £77
Cambridge Pascal – £77

Oak Logic – £77
Oak PCB – £77

• **Oxford Reading Tree Stage 2 Talking Stories** – Sherston Software and Oxford University Press have combined to produce "an exciting and motivating way of consolidating vocabulary and learning to read at Stage 2". Anyone who has seen Sherston's Naughty Stories and More Naughty Stories will appreciate the value of this team-up with OUP. This pack of six stories by Roderick Hunt is animated with Alex Brychta's illustrations and Hannah Gordon is the narrator. The cost is £39.95 +VAT from Sherston Software or £44 through Archive.

• **PenFriend** – This is a "predictive typer" from Design Concept. What that means is that, as you type, it offers you suggestions of what word you might be typing. You can then avoid typing the whole word and just click the mouse or press a function key to select from the list of words that PenFriend offers you. You can have your own sets of commonly used words so that it can guess more quickly what word you are typing. PenFriend costs £25 +VAT from Design Concept.

• **Pocket Book offer extended again** – Acorn's offer on Pocket Books and Schedule has been extended again – this time to 31st March 1994. The Pocket Book is therefore still £200 (instead of £250) through Archive and Schedule is £19 instead of £49. The Class-pack of 11 Pocket Books plus an A-Link plus Mains Adaptor is on offer at £1699.50 +VAT or £1950 inclusive through Archive.

• **Pocket Ethernet Adaptor** – Atomwide are now offering an Ethernet adaptor that works on any of the Acorn Computers that have a bidirectional parallel port (A4, A3010, A3020, A4000, A5000). It is easy to install and remove and therefore offers a degree of adaptability not offered by the normal Ethernet podules – and, of course, it saves a podule slot. It is currently only available as a 10base2 interface but a 10baseT version is under development. The Pocket Ethernet Adaptor costs £199 +VAT from Atomwide or £225 through Archive. It is fully IEEE 802.3 compliant, has a 64Kb local buffer memory and offers a transfer rate of 200Kbps peak.

• **PocketFS2** – The new A-Link software which was reviewed briefly last month (p71) is now available as an upgrade for existing A-Link owners. Send £9.95 (inc VAT & p&p) plus the original A-Link floppy disc to Acorn Direct in Wellingborough. This offer lasts until the end of April 1994.

• **Primary Information Management System** (PIMS) is a package produced by Longman Logotron and Acorn Computers to provide a ready-to-use system that will handle pupil and staff records, budgeting and accounts, maintenance, insurance and inventory. It stores individual records relationally, not hierarchically, giving flexibility in retrieving the data to put straight into reports such as pupil assessment sheets, class lists and registers. For those schools already using SIMS (the school secondary version) all data can be transferred directly into PIMS. The package includes an A4000 or A5000 computer with SVGA (AKF50) monitor, inkjet printer, software, hotline support, start-up consumables, training, delivery, installation and on-site maintenance for an all-inclusive price starting from £1,999 +VAT (for the A4000 version) or £16 a week using the Acorn Options rental scheme.

• **PrimeSolver** – The latest in Minerva Software's "Prime" series aimed at education in the primary and lower secondary sector is PrimeSolver. This is described as "a creative and practical problem solving system for entertainment purposes whilst being highly educational at the same time". (I had a look at it at BETT and it certainly seemed to be a lot of fun!) It is basically a way of creating simulations and solving mechanical puzzles using real-life mechanics of ropes, pulleys, cogs, engines, pipes, etc. There are almost 60 tools provided to solve various puzzles, 16 of which are provided with the pack although you can design your own puzzles with the design mode provided. PrimeSolver costs £79.95 +VAT from Minerva or £88 through Archive. There are primary and secondary site licences available for £120 and £320 +VAT from Minerva Software.

• **Pro-Drivers from Oak Solutions** – Despite what we said last month about Oak Solutions (Ace) Pro-Printer Drivers no longer being sold (sorry for the confusion!) they *are* still very much available. What is more, they have come down in price making them more competitive than the CC TurboDrivers. The Ace Pro-Drivers for Canon LBP 4/8, HP compatibles and Epson ESC-P2 compatibles are

now £35 +VAT each or £39 through Archive and if there is an Acorn driver (RISC OS 3) for your printer then you can use the Standard Pro-Driver which is only £15 +VAT or £17 through Archive.

• **Report Writer** from Creative Curriculum Software is a package for the production of individual reports and assessment sheets using National Curriculum statements of attainment. It gives easy access to all the National Curriculum statements which can then be transferred into any other RISC OS application. You can add words, phrases and sentences from within datafiles to produces your reports. A single user version of Report Writer (for KS 1/2 or KS 3/4) costs £49 +VAT. You can also buy upgrade packs to increase the numbers of users and/or get other Key Stage data discs, manuals, etc – contact Creative Curriculum Software for full details.

• **Repro** is a professional tool from Oak Solutions which allows the user to manipulate the exact translation of colours from screen to paper. It gives complete control over screen size, screen angles, gamma correction, grey balance and black removal. Multiple palettes can be defined so that differences caused by various types of printer or paper can be minimised. You can also use the system to produce special effects such as tweaking a colour to make it more vivid or enlarge halftones to show individual colour spots. Repro can also produce colour separations in various forms. It costs £50 +VAT from Oak Solutions or £55 through Archive.

*(This product **only** works with Acorn's new RISC OS printer drivers... but they aren't ready yet. Ed.)*

• **RF design software** – Steve Hunt has developed a number of applications which will be of interest to both professional and amateur RF design engineers. They include a filter designer, a receiver noise figure/intercept point analysis tool, an inductance 'ready-reckoner' and a Smith Chart design aid. For more details, contact Steve Hunt at 21 Green Street, Milton Malsor, Northampton, NN7 3AT (0604-858090 after 7 pm).

• **RISC OS 3 – First Steps** is another new book by Anne Rooney, again aimed at the beginner. It replaces, but is considerably bigger (at around 500 pages long) than, the popular Archimedes First Steps. It provides an introduction to Acorn RISC OS 3 computers, dealing with each topic in considerable depth. It also provides up-to-date information about developments such as CD-ROM, multimedia and special needs provision. RISC OS 3 First Steps costs £14.95 from Dabs Press or £15 including p&p through Archive.

• **Seelinks** are educational packages from ESM. The first, Seelinks – Ourselves, is aimed at children in Key Stages 1 & 2 and provides material for data handling to enable the children to collect and analyse data about themselves. This pack costs £32.50 +VAT (including a site licence) from ESM or £36 through Archive.

The second pack is Seelinks – Transport and is aimed at children in Key Stage 2. It uses the subject of transport to develop skills in the data-handling area. Transport costs £39.50 +VAT (including a site licence) from ESM or £44 through Archive.

• **Sibelius 7** is the much-acclaimed "expert system for music engraving". If you are wanting to produce printed music, it seems that Sibelius 7 has all the facilities you could possibly want. The full package costs £760 +VAT but, for non-professional users, there is a special offer price of £485 +VAT. We hope to have a review of this amazing package fairly soon.

• **Sibelius 6** is an education version of the full professional music notation program, Sibelius 7. It has a simplified user interface but it can still handle complex orchestral scores, all traditional musical notation and a wide range of contemporary notation, Midi input and output etc. Sibelius 6 costs £160 +VAT from Sibelius Software.

• **Soundcard** – This is a 16-bit sound sampling board from Irlam Instruments. it samples at a wide range of frequencies including CD and DAT standard. You can record and replay sound directly to and from hard disc. The Soundcard costs £299 +VAT from Irlam Instruments or £330 through Archive.

(More details will be given about this and the next product in David Lenthall's two-part article about digital audio. See page 43.)

• **Super Sound Expansion System** – Expressive Software Products have produced a podule which provides high quality sound output from the Archimedes. It contains synthesizer chips with 170 different wavetable instrument sounds which are sampled from the original instruments. The output, which is 16-bit CD-quality sound, is fed to an external box which provides a standard jack output with volume control as well as Midi, phono and mini-jack outputs. All you then need is your favourite Midi music package and you are all set to produce CD-quality music. Super Sound Expansion System costs £249 +VAT from Expressive Software Products.

• **Talking Computer learning materials** – Longman Logotron have published materials to be used with Talking Pendown which are said to make "lasting improvements in reading, writing and short term memory". It has been tested on 68 children aged between 7 and 14 with serious reading and memory difficulties and the results obtained were "impressive". The materials cost £29 +£3.53 p&p from Longman Logotron and Talking Pendown costs £64 +VAT (or £69 through Archive) for a single user licence or £190 +VAT or £330 +VAT for a site licence (primary or secondary respectively).

• **The Civil War** is the latest in Anglia Television's series of Key Plus datafiles. It enables students to study the English Civil War of the 17th Century, focussing mainly on events in England and Wales but also including information and illustrations from Scotland and Ireland. The datafiles, which are accompanied by a 24-page photocopiable A4 booklet, include information on 150 battles and skirmishes including information from the latest research, a Key Plus Map system to help in searching the data, a case study of the Parliamentary Garrison at Chadfield in Wiltshire and biographies of many of the principal leaders of the War. The Civil War Key Plus pack costs £22 +VAT from Anglia Television.

• **Time Detectives – The Victorians** – This is a new adventure-back-in-time from Sherston Software written by Simon Hosler, author of Crystal Rain Forest. It begins when three local children mysteriously disappear in the sleepy seaside town of East Heston and pupils, taking on the role of a reporter for the local newspaper, are given the task of trying to track them down. The package focuses on the changes since the Victorian era in "an original and entertaining way". The package includes user's manual, a teacher's book with ideas for classroom use, a catalogue of Victorian artefacts together with sets of work and information cards to be used in conjunction with the program. The Victorians costs £39.95 +VAT from Sherston Software or £44 through Archive.

• **Twain** image acquisition software (see Archive 7.4 p4) is now available for the Canon scanner (ScanLight Professional) and the Epson GT scanners. They cost £20 inclusive from David Pilling or £19 through Archive.

• **Ultimate Expansion CD-ROMs** – There are now two CD-ROM drives available that work with the HCCS Ultimate Expansion System. Both are Acorn Replay, multi-session and PhotoCD compatible. Each includes an interface in the form of a micropodule for plugging into an Ultimate multipodule. The single speed drive (150 Kb/s) is £229 +VAT or £265 through Archive and the dual speed drive (300 Kb/s) is £289 +VAT or £335 through Archive.

• **Ultimate Expansion System** – There are also some new (sadly, higher) prices for HCCS Ultimate Expansion System Starter Packs. We have therefore changed the Archive prices as follows: The SCSI Starter Pack has increased to £114. The HiVision Starter Pack has been withdrawn and replaced by a Colour Vision Starter Pack at £182. The Midi + HQ Sound Sampler Starter Pack has been withdrawn and replaced by a Midi Starter Pack at £114.

• **XLisp** – This is a version of Common Lisp with object oriented features (as mentioned in Acorn User February 1994). It is available from David Pilling at £5.99 or £6 through Archive inc p&p.

• **Xword** – Panda Discs' crossword puzzle generator/solver program (reviewed last month on page 59) has had some of Roger King's suggestions implemented and the price has dropped to £39.95 inclusive. A site licence is now £95.

Review software received...

We have received review copies of the following: •Artworks Made Easy (bk), •Basic WIMP Programming (bk), •Carnage Inc. (g), •CD-Net Trial Pack (u), •Celtic Clipart (a), •Easy Font – Needs to be compared with FontDir (u), •Fortran 77 & Front-end (l), •Impression Style Resource Disc (a), •Jumble Fun (e), •Kerner (u), •LingoMaster (e), •Oxford Reading Tree Stage 2 Talking Stories (e), •Party, Wedding & Anniversay Clipart (a), •Payroll Manager (b), •PrimeSolver (e), •RISC OS 3 First Steps (bk), •Sounds & Rhymes (e), •Switch (g), •The Church Year Clipart (a), •The Civil War Key Plus Pack (e), •Time Detectives – The Victorians (e).

e=Education, b=Business, bk=Book, l=Language, u=Utility, g=Game, a=Art.

If you would like to review any of these products, please contact the Archive office. Potential reviewers will need to show that they would use the product in a professional capacity or that they have some knowledge of the particular field.

Credit where it's due

• **Pineapple Software** – I purchased a video digitiser some years ago from Pineapple and it worked well until recently when the picture started to break up. I rang Pineapple who suggested I returned it, apologising for the inconvenience and saying there would be no charge. I think they thought I had just bought it and that it was under warranty. I knew that as soon as they saw the dust on it they would realise it was not new and expected to get a bill for its repair. I posted it on Tuesday afternoon and it was back again on Thursday morning – imagine how surprised and pleased I was to receive it back so quickly and with no bill – a tribute to the post as well as the excellent service from Pineapple. All I can add is a thank you and a guarantee of my future custom. Alan Highet, Nottingham.

If you have had particularly good service, send details in to the Archive office. Thanks. Ed. A

Computer & Electronics Holiday for Young People !!

Scripture Union runs a Computer & Electronics Holiday for 13 to 16 year olds (boys and girls) at an attractive school in the Hertfordshire countryside.

The dates? August 1st – 9th, 1994.

The price? £112.

For details, write to Jim Maddox, S.U. Holidays, 69 Claverdale Road, Tube Hill, London SW2 2DH or phone 081-671-8761.

LOOK systems Font Directory

A font filing system

Font Directory is the only font management application which contains a dedicated font filing system. All other programs work by simply swapping whole directories or moving font files from one folder into another.

Although writing and desiging a font filing system has taken more time and effort, it offers some additional benefits...

- **More flexibility** – Individual fonts (not just families or directories) can be installed and removed. You can also organise your fonts into categories, families and weights.
- **Saves space** – By using directories which only take up 2K, the space used by your font collection can be reduced.
- **Kind to discs** – Unlike some systems, font availability is controlled in memory and not by moving font files on the disc. This saves a lot of unnecessary disc access and speeds up the availability of your fonts.
- **No limits** – Well, not exactly... you can store over 5900 font families! And you can make many of these fonts available at any one time – typically over 700 font families.
- **Network friendly** – A special version of the software is available for network users. This allows each station to have a personal view of a central collection of fonts stored on a file server.
- **Star commands** – If required, star commands are provided to allow you to specify which fonts should be made available.
- **RISC OS compliant** – It works with both RISC OS 2 & 3 and is desktop compliant. As registered developers, the calls and messages provided are officially recognised by Acorn.
- **Well documented** – It comes with a 32-page printed manual which includes both a primer and a detailed description of the facilities provided.
- **Reviewed** – Here's what the reviewers say:

RISC User, Jan/Feb '94: *"This program provides the kind of facilities which should have been built into the operating system in the first place. It is very easy to use, and I find it utterly invaluable. Anyone who has more than a handful of fonts should buy it without delay. It is superbly presented, operates flawlessly, and has become a permanent addition to my iconbar."*

Archive, Sept '93: *"The real pièce de résistance is the facility to scan documents and files and install the fonts required automatically. This is a dream to use. I have always found it frustrating that Impression would simply replace all uninstalled fonts with Trinity without even giving the option to abort loading the document. Draw would replace unrecognised fonts with the system font. Now that is all a thing of the past.*

I was very happy with Font Directory. I found it very easy to install and use with minimal reference to the manual... this is a highly intuitive application – a great deal of care and thought must have gone into its design and realisation. It integrates seamlessly with RISC OS and if you use a lot of fonts, you have to have Font Directory."

Hundreds of outline fonts are now available for the Archimedes and new fonts are being produced all the time. This is all very well, but it does mean that using and managing fonts is becoming increasingly difficult.

What is Font Directory?

Font Directory is a radical approach to storing and using outline fonts within the RISC OS desktop. At its heart is a dedicated font filing system which provides the user with an unparalleled level of control.

Easy-to-use

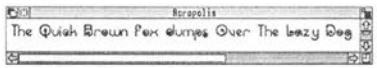
Using techniques pioneered by LOOKsystems, Font Directory allows you to install fonts at the click of a button without the having to restart your application.

Just select the fonts in the FontList window and click on the 'tick' icon.

(If you wish, you can specify which fonts will be available on start-up and save favourite lists of fonts for later use.)

Font viewer

A preview window is available to help you decide which fonts you wish to install or just to remind you what a particular font looks like. If required, the text, size and colours used to display a font can be defined and even saved for later use.



Document scanning

The most powerful feature, however, has to be the ability to scan other applications' documents. When a document is dropped onto Font Directory, the fonts used will be made instantly available.

At last, no more 'font not found' errors!

FREE trial offer

Font Directory does a lot more than we can explain on a single page and so we are offering you the opportunity to try the software for free.

Just contact us at the address below and we will send you a complete pack. This can be returned within 10 days and you won't be charged a penny.

Otherwise, you can keep the software and we will invoice you for £35 inc VAT and UK P&P.

This offer only applies to UK residents.

LOOKsystems, 47 Goodhale Road, Bowthorpe, Norwich, NR5 9AY.
Telephone: (0603) 748253. Facsimile: (0603) 764011.

A hard disc is recommended and you will need enough space to store all of your fonts. Most major applications and file formats are supported.

Norwich Computer Services Open Day

10am – 4pm, Saturday 12th March 1994

Thorpe St Andrew Lower School, Longfields Lane, Norwich.

A star-studded cast...

After the success of our first Open Day in November last year, we're holding another event in March which promises to be even bigger and better! We are delighted to have so many leading companies from the Acorn world joining us as exhibitors and there certainly will be something to interest a very wide range of computer users.

If you look at the full list of exhibitors at the foot of the page, you will agree, I'm sure, that the companies and organisations who will be joining us represent the foremost names in Acorn technology and products today.

The Open Day will be a great opportunity to see, try out and buy the latest hardware and software products. You will be able to chat about them with the experts and find out about current developments in the Acorn world. For those of you who missed Acorn World 93 and BETT 94, or who can't wait for Acorn User Show in Harrogate in April, it will be an ideal place to meet all these top companies under one roof and in a friendly environment!

Other items on demonstration by individuals rather than companies include computerised embroidery and computer video-editing.

A warm welcome to Archive Members

We are extending a special welcome to all our subscribers at an Archive Members area, hosted by a number of contributors who are old friends of Archive: Trevor Sutton, Hugh Eagle, David Holden and Richard Rymarz. They will be available to talk to you about anything relating to their Archive columns, Acorn/Archimedes issues in general or your particular queries. Hopefully, there will be a number of other contributors around and I'm sure it will be an extremely useful forum for sharing ideas.

There will be a display of the history of Archive, charting its growth and development from the very first issue 1.1 in October 1987 to today. All back issues will be on hand to browse through, plus a special offer price on complete sets of Archive volumes 1 – 6.

In the Price List this month, you will find a Refreshments Voucher with the compliments of Archive Magazine. You can use this at the Open Day to get yourself a drink and a bite to eat "on the house" !

Special Open Day discounts for Members

Extra discount will be available to Archive Members with orders placed on 12th March. This will be in the form of a £10 voucher (or £5 discount) with

Companies coming to the NCS Open Day

Anglia TV Education	Cumana	Norfolk IT Team
Acorn Computers	Digital Services	NorthWest SEMERC
Atomwide	Epson UK Ltd	Oak Solutions
BirdTech	GamesWare	Sherston Software
Canon UK	HCCS	Sibelius Software
Clares Micro Supplies	Icon Technology	S J Research
Cogent Software	Longman Logotron	Topologika
Colton Software	LOOKsystems	Wild Vision
Computer Concepts	Mystery Software	Wyddfa Software

orders over £100; a £25 voucher (or £15 discount) with orders over £250; a £50 voucher (or £30 discount) with orders over £500. The vouchers can be used for any subsequent purchase from NCS.

Charity Bring & Buy – Will you help, please?

At our last event, we had a most successful Charity Stall and we are doing this again. All proceeds of the Charity Stall will go to the Battersey Cats' Home. It's the ideal time to send in or bring along unwanted items of Archimedia to be sold in aid of charity. People are more prepared to buy second-hand items if they can actually see them before buying. So please have a look to see if you can find any pieces of kit or software that you don't need any more and would like to use from someone else's benefit – send it to the NCS office as soon as possible (or bring it with you) and we will turn it into a Charity Donation at the Open Day!

Practical details

It is my hope that Archive Members will come along and see us at the Open Day and so, to help you make up your mind, here are some of the practical details that you might be considering...

Thorpe St Andrew Lower School is about 2½ miles from Norwich railway station. The taxi fare from the station to the school is about £3.50. There are buses which run from just outside the station to the school every 12 minutes and the fare is 88p.

A weekend in Norfolk?

If you are thinking that you might like to combine your visit to the Open Day with a weekend in Norwich/Norfolk, we have a list of Norwich hotels and accommodation, provided by the local Tourist Information Board. We will send copies of this, together with a map of Norwich to show how to get to the Open Day, to anyone who rings or writes to the NCS office with a request.

The NCS staff are very much looking forward to the Open Day and we would be delighted to see you there – come and introduce yourself to us and meet fellow members of the Archive user group! A

WILD VISION

JOB VACANCY

TECHNICAL SUPPORT ENGINEER

Wild Vision is the leading developer and manufacturer of expansion cards for the Acorn range of microcomputers, and a subsidiary of Computer Concepts Ltd., the Acorn industry's largest and best-known software developer. Over the years, Wild Vision has been responsible for some of the most innovative products in the Acorn marketplace and has specialised in Video, Graphics and MultiMedia products.

Due to continued expansion Wild Vision is upgrading its technical support service and will be implementing a new after sales care package which will be second to none in the industry. This has given rise to a vacancy for a Technical Support Engineer to join our team based in the North East of England.

This position offers an excellent opportunity for an Acorn enthusiast who will provide a first class service including managing enquiries, monitoring repair processes, and systems administration.

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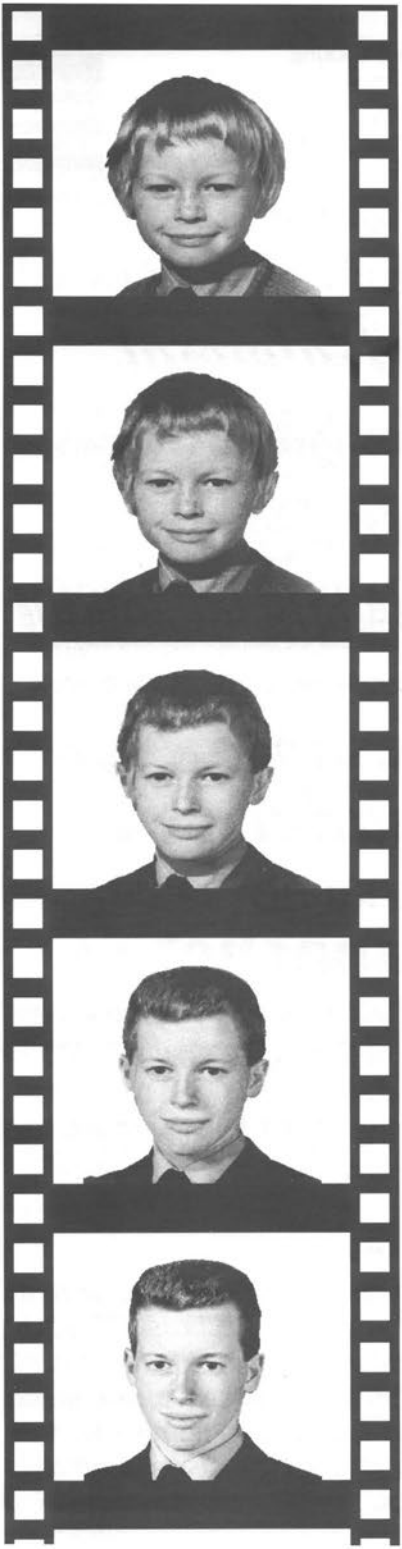
Please forward a C.V. stating current salary to: Peter Wild, Wild Vision, 15 Witney Way, Boldon Business Park, Tyne & Wear, NE35 9PE.



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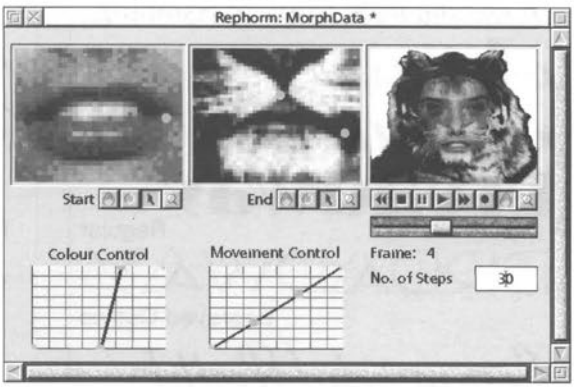

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Comment Column

• **Computer experts** – Have you ever had a problem with your machine, or a piece of software, and had to make contact with an expert? You what an expert is... those programmers and engineers who inhabit dark spaces deep in the ground. Their great joy in life it is to humiliate us poor unsuspecting morons who only know about on and off switches, and double-clicking on buttons.

I hate making contact – or should I say 'interfacing' – with these high priests of the computer world. Before I ring, it takes me hours to summon up enough nerve to make the call. My hands start to sweat and my mouth goes dry. Then as soon as one of them comes on the line, all attempts at lucid thought fail miserably – my mind goes into 'fatal internal error' and everything that comes out of my mouth only reinforces the impression he has... that I'm a moron.

In a vain attempt to try and lessen this impression, I now write down helpful phrases which I hope will convince them that I know more than I actually do... "I'm using v.2.1 of your software on an A5000 running RISC OS 3.10, with a SCSI card, in a blueish-grey room on a brown desk". I usually feel fairly confident at this point – but then comes the secret handshake which reveals whether I'm one of them or not... "are you using vector separation on your podule or are you still in a quasi reverential input mode..." The long silence that follows tells it all – he knows I'm a moron! I can feel him looking around his office at his colleagues, eyes raised with that look of... "I've got another one, lads."

I usually come off the phone thanking him very much for all his help but knowing that I haven't a clue what he was talking about and probably I'll have to live with the problem for the rest of my life.

What I long for is experts who will understand that most of us who use these machines have no idea how the things work – and don't want to know – all we want to know is which button to press to make it do what we want. OK, there may be times when I have to shift-double-click on an icon, and maybe delete or change something, but that's about as far as it goes.

One expert – from a well known and much-loved company (not NCS!) – told me, rather sardonically, that my problem was probably very complicated and he didn't want to waste time trying to explain it to me... so I wrote, two weeks ago – I'm still waiting for a reply. Gabriel Swords, Norwich.

• **Flopticals for ADFS, part 4** – When I installed a new version of the ROM for my Morley SCSI board (1.13), I had some difficulty setting up the system – one of the two icons representing my Floptical drive had disappeared and would not reappear despite attempts to reconfigure the computer. The missing icon was 'SCSI drive 0' which was the nominal floppy drive that handled ADFS discs. It turns out that Morley have removed the software for handling ADFS discs from their latest ROM. (They have stopped marketing Floptical drives altogether.) The situation is actually more complicated than that. The drive does still recognise 1.6Mb discs as well as its native 21Mb discs – it will read and write files to both these formats and correctly works out the size of the disc. Morley seemed rather surprised by this when I spoke to them on the phone. However, the drive will definitely not recognize 800Kb discs now. Philip Draper, Borehamwood.

• **Frontier – Elite II** – Many Archimedes users loved (and still love) the greatest space game ever made: Elite. Today the sequel has arrived, named Frontier – Elite II – but sadly not for the Archimedes. Currently, there are PC, Amiga and Atari versions available but the author, David Braben, made the source code independent, which makes a conversion easier. The question is, will he do the conversion? For this reason, I have collected some reviews, stories and addresses into a small application. This will give you a look into the game and write a demand for a conversion! If you want a copy of this application, then write a request to my e-mail address: atle.baardholt@kih.no. *(There's a copy on the monthly disc. Ed.)* Atle Mjelde Bårdholt, Norway.

• **Hard disc life expectancy** – Back in July, my A5000 (with Oak SCSI card) failed to boot up in the normal fashion, due to my three and a half year old 70Mb Rodime drive not spinning up. After switch-

ing the computer off, waiting a while, and then switching it back on again, the problem seemed to have gone away (*huge* sigh of relief). About a month later, the same thing happened again but fortunately, the power off-on sequence seemed to do the trick. A fortnight later still and the problem occurred more often than not, and required more than one attempt to kick the drive into life.

A phone call to Oak Solutions brought the depressing comment "the average life expectancy of a hard disc drive is between three and five years". Ouch!! So, if you've got a hard drive that is over three years old and the contents aren't backed up, *back it up, now!* The suggested explanation of the fault was that the bearings wear with age, such that the power supply is unable to supply enough current to overcome the friction to initially get the drive spinning, and that this is a *definite* indicator to start thinking about a replacement drive.

Is a life of 3-5 years really typical for a hard drive, or have I just been unlucky? Most people probably aim to keep a computer for five to ten years before buying a replacement. That the hard disc may need to be replaced during that period is a budgeting factor I've not seen mentioned. How long can a removable type drive and cartridges be expected to last? I had always been of the opinion that you should buy the largest capacity drive you could afford, as you will fill it up eventually. Though if it's going to die before its half full, I'm not so sure. David Lenthall, Walworth, London.

• **Image Enhancement** – Further to Cain Hunt's request for a simple/cheap image enhancer (7.1 p26), I've obtained Henrik Pederson's excellent !Process application which handles a range of 256 colour/greyscale image types and does all sorts of wonderful things with them. !Process used to be shareware but the plan is for Oregan Developments to release a commercial version called PhotoTouch in the near future. In the meantime, Henrik has put v1.21 into the public domain. *(We have a copy and could put it on a Shareware disc – but I'm afraid there's no room on this month's program disc. Ed.)*

• **Mouse mat vandalism** – We have a room full of Apple Macs at school and have found that the screens on the LC2 take so long to refresh that kids vandalise the mouse mats while they are waiting. Meanwhile, the almost identical mouse mats on our two A5000s are in near new order after the same period of time and many more hours of use. Alan Jackson, Oamaru, N.Z.

• **Oak SCSI cards** – A few words of warning to owners of Oak SCSI cards, who may find themselves looking for a second or replacement drive.

According to Oak Solutions, Fujitsu drives should be avoided with their interface, though according to Arm Tech Ltd the 540Mb Fujitsu drives which they use present no problems with an Oak card.

Due to the death of one of my hard discs, I was in need of a replacement drive. As Technology Matrix were advertising a 330Mb Fujitsu drive (2622FA) at a bargain price, I opted for one of those. To cut a long story short, although the drive seemed to work all right, when I tried to fill the disc to capacity, I found that I couldn't access beyond the first 271Mb.

So back went the Fujitsu drive for exchange. This is a shame, as in many respects it was a very nice drive. It was noticeably faster than my Quantum 100Mb drive as the following table reveals (using the speed test routine in Oak's "!SCSIForm") :

	Mode 0	Mode 15	Mode 21
Quantum 105S	1054Kb/s	1021Kb/s	1054Kb/s
Fujitsu 2622FA	1655Kb/s	1655Kb/s	1352Kb/s

Also, the Fujitsu's reliability (MTBF) was quoted as being 200,000hrs (i.e. about 23 years of constant 24hrs/day usage), so they are quite safe in offering a five year guarantee. It can also be configured as a SCSI 1 or SCSI 2 type device. (All Archimedes SCSI cards are SCSI 1, probably because the podule bus bandwidth is a limiting factor which would preclude any benefit from using a SCSI 2 interface.)

So, if anyone has an Oak SCSI card and is thinking of adding a Fujitsu drive, ensure that the particular model is known to work (fully) with it. The 540Mb drives which ARM Tech Ltd supply may well be OK, but it doesn't seem to apply to all models.

The onus of this problem seems to lie with Oak, as it is their SCSI firmware which is 'temperamental' with Fujitsu drives. The drives themselves are specified as being "fully SCSI compliant", and apparently they work with no problems on a Morley SCSI card.

A big ***thank-you*** to Lee Henderson of Matrix who was extremely reasonable and understanding throughout the whole exercise and who allowed me to try out the Fujitsu drive on a sale-or-return basis. I finally opted for a Quantum 240Mb drive to sit alongside the 100Mb Quantum already present. Both drives have performed faultlessly.

I was advised *not* to use a fan silencer with 2 drives. Re Colin Buckland's comments (6.12 p29) about his drive's death and rebirth and the implications against the fan silencer, I have decided to remove this from my machine (it didn't reduce the noise much, anyway). It would seem to be more sensible to spend the money on a quieter fan (e.g. a low-noise Papst device). Does anyone know of a suitable source? David Lenthall, Walworth, London.

• **Phaethon definition** – The result of our 'Call My Bluff' competition (Archive 7.4 p20) is that only *one* person got the correct answer – ALL THREE definitions were correct! They all came out of my Collins English dictionary. So I have therefore sent TWO mugs to Eric Hunter of Hitchin, the only person to come up with the correct answer. Well done, Eric! (Actually, he assures me that it is also a tropical bird – a type of boatswain-bird – but I don't know if that is a bluff or not!!)

Phaethon ('feɪəθɒn) *n.* a small asteroid that has an orbit approaching close to the sun and releases fragments of dust that enter the earth's atmosphere as meteors.
Phaëthon ('feɪəθɒn) *n. Greek myth.* the son of Helios (the sun god) who borrowed his father's chariot and nearly set the earth on fire by approaching too close to it. Zeus averted the catastrophe by striking him down with a thunderbolt.
phaeton ('feɪt'n) *n.* a light four-wheeled horse-drawn carriage with or without a top, usually having two seats. [C18: from PHAETHON]

• **To K or not to K?** – Going back to the debate on the use of 'kb' or 'Kb' to represent kilobyte. 'K' is the SI abbreviation for Kappa (10^{18}). Certainly, RAM in quantities measurable in Kb (kappabytes) is very attractive, though it is not very practical, financially. At £30/Mb, 1Kb would cost £30,000,000 million. No doubt you could get a discount, but you may have to wait a while for the order to be fulfilled. On the subject of waiting, the time taken to refresh the RAM (assuming that it is of the dynamic type) would require some fairly hefty processing in itself. So really, the use of either 'k' or 'K' to refer to 1024 is wrong.

I personally use 'k' and rely on the context to say whether it's 1000 or 1024. To further the argument for the use of 'k', the approximation when using 'M' for 1,048,576 (1024k) as opposed to 1,000,000 seems to be accepted without question. David Lenthall, Walworth, London.

• **Stability of Impression Style 3.01** – So far, I have noticed only one one bug which will always cause Style to crash completely, forcing a reset: when I click <adjust> on the Close icon of an "Untitled" Style document. (In RISC OS 3, this would normally cause the parent directory window to be opened but, of course, before the first Save, the document file doesn't have one.) This effect does not occur after version 2.17 of Impression has first been run.

There is a small incompatibility with Keith Sloan's utility !RMA-Man(ager), version 1.6, which I use as the simplest way to remove modules that I no longer need. Style's spell checker sometimes (maybe on one occasion in five) responds to any such attempt with an error message about an unknown SWI and with a complete crash.

A very minor harmless bug concerns Autosave. If you press <f3> just when the next Autosave is due, you will find two Save boxes on your screen, and the Autosave prompt will remain even after you have clicked OK in the other Save box.

There is a bit of a difficulty for users who have a foreign language version of RISC OS in their machine, e.g. the German 3.19 version. During the installation of Style, an application !CCShared is put into !System. This, in turn, contains the !HyperView application which is used for !WordWorks and the Interactive Help. The !Hyperview directory contains Resources.UK, but no Resources.Germany, causing both programs to fail. If you just rename the UK directory to Germany, various error messages will appear during operation, so the thing to do is to *copy* the UK directory as Germany, so that there appear to be resources for both countries.

Despite these minor niggles, I am very satisfied with the upgrade. Jochen Konietzko, Köln, Germany

• **Talking Wordprocessors** – In Archive 7.5 p57, I mentioned that Icon Technology offer a voucher worth 50% off the cost of PEP's speech program when you buy StartWrite. However, even if you purchase a site licence of StartWrite, this voucher is

only good for a single copy of SpeechSystem – which seems a bit pointless. Since then, I have spoken to PEP Associates who agreed that with the single user version, we had "permission to copy it for use on as many machines" as we like on site. I'm not sure what the difference is between that and a site licence, but... if it walks like a duck... ! Thanks, PEP. Joe Gallagher, Hackney.

• **Whither Acorn?** – That's the question I keep asking myself. Not that I've got any right to ask – I'm not a shareholder or anything. But it's a question I find myself asking the more I use these machines.

Is Acorn's market, for example, the average home user who wants to do accounts and write the odd letter, or who wants to let the kids play a few games? Surely not. If all you want to do is play games then you'd be better off buying a proper games machine – they're cheaper and there's loads of games available to play. If you want to do simple things like accounts and letters then buy a PC, or one of the more user-friendly, and cheaper than an A3010, Macs. To do any of the above using ARM 3 technology is a bit daft – it's like buying an MG to do the weekly shopping.

Well, is it aimed at the professional market – the place where all this power can be used to the full? The place where PC's and Macs have reigned supreme for years? It's the most logical of places, but is the hardware and software really up to it?

I consider myself to be a professional user – I write and design things on an A5000, and people pay me to do it. I'd like to continue using it. I'd like to see it gain more credibility in the professional design market, but I find myself getting very frustrated it.

Today, yet again, I've had to re-do some PostScript files because when I sent them to the image setting bureau, the separations didn't work. On another job, the pages were cropped all round and I ended up preparing the artwork manually.

The programs I use are supposed to be 'at the cutting edge of Archimedes technology' but, in truth, they only work correctly, for me, 85% of the time. When I used a Mac I got to see the dreaded 'Bomb' about three times in three years – on my A5000 I have an average of three crashes a month, plus a whole host of strange error messages which shut down the program I'm using as soon as I go near the OK button. This is not a very professional way of running a computer company!

"Ah but", I hear you say – "they're cheaper than the opposition". That's true of the software, but not of the machines – in some cases Acorn machines are more expensive. But if the software only works properly 85% of the time, it's no good to me. For me, the two best design and page layout programs available for the Archimedes are Impression and Artworks, but even in their new forms, are still two years behind Pagemaker and Freehand.

For a professional designer, it doesn't matter how fast the machines are or how cheap the software is, if it doesn't do the job. And being unreliable means I have to waste time re-doing things – and that costs money – money which could be spent on more reliable software!

So is it a schools machine? Traditionally the answer is, of course, yes. There's certainly a lot of educational software about. My children use Acorns at school and they like them – but they also use Macs, and they like them too! If Apple and the PC manufacturers see a profitable market in schools, you can bet they'll be in there with plenty of software to support them, and suddenly the fast, but expensive, Acorn machines will be left behind.

I really do hope Acorn machines, and all the software that goes with them, achieve something substantial in the professional market place – I think they need to if they are going to survive. To do this they need to recognise that speed and raw power isn't everything – though, clearly, having the speed and power gives them a lead over the others. On the other hand, if the machines and software don't do the things people want, they won't buy them.

It's time they came of age and took the professional user more seriously – that doesn't just mean supersonic ARM7's – it means giving us the stuff to do the job as well as Macs! Gabriel Swords, Norwich.

There is an element of truth in what Gabriel is saying but, personally, I think he is over-stating the case to try to stir Acorn and third-party companies into action.

Let me tell you the history of Gabriel's life in DTP (he's a personal friend of mine so I'm sure he won't mind!) as it makes his comments even more poignant.

He was born and raised on Macs but, for several years now, he has popped into the NCS office fairly regularly. He used to watch over my shoulder as I worked on Impression on my A540. One day he asked if he could have a play with Impression – he was impressed! Eventually, without any persuasion, he asked us to quote for a DTP system based on an A5000. As you will gather, he bought the A5000 and Laser Direct and has had good use out of it.

I have to say that Gabriel has had more hardware and software problems than most – which obviously colours his view of Acorn. I used to wheel him out to 'give his testimony' to Mac-using customers who were thinking of changing horses – but I won't let him near them now!

Hopefully, the latest versions of Impression and Art-Works (which Gabriel hasn't got yet) will help to lift his spirits but there is 'room for improvement' as the Acorn community's school report would probably say. Ed. A

JPEG Column

Stuart Bell

!Replay vs. MPEG

In January, I raised the question of whether Acorn's development and support of the technically excellent !Replay full motion video system would leave Acorn users at a disadvantage when the rest of the PC world seems to be going for the MPEG standard. The advantage of !Replay is that it can be replayed without any special hardware provision, whereas MPEG decompression is too computationally complex to be performed only by software.

After making those comments, I read both a review of, and advertisements for, ReelMagic, a £400 (inc VAT) board for the PC that will decompress in real time MPEG sequences with up to 32K colours at up to 1024×768 resolution. Most significantly, it is compatible with the new VideoCD standard for storing games and movies on CDs. Currently, the maximum run-time is 72 minutes. The compatibility, of course, is due to the use of MPEG compression. When VideoCD gives full motion video of that quality, and decompression boards have plummeted in price as most PC products do when they become commodity items, will Acorn users be looking enviously at the low cost of VideoCD discs, made possible by the scale of the market?

Also, in January's Computer Shopper (which, given the PC-obsessive nature of PCW, is now the only true multi-platform magazine) I read that Commodore have announced an MPEG board for the latest Amiga, using a single-chip MPEG decoder and costing $250 in the USA. This just underlines my point about industry standards – it's either a brave or a foolish company which ignores them. I also note a recent advert for an MPEG real-time compression board for PCs – Video Maker™ – from a French manufacturer. The board also decompresses MPEG files. Perhaps the fact that no price is quoted suggests the worse, but it does demonstrate that single-board MPEG solutions are possible.

Is !Replay a technically-excellent but commercially out-gunned blind-alley? We shall see – but perhaps only when it's too late. For a detailed but highly readable description of how MPEG works, don't miss the February issue of PCW – which seems to be sold on MPEG to judge by its 1994 awards.

!ArcJpeg

Tim Twell wrote into the Archive office to report on a JPEG application which he had downloaded from Usenet. It's a freeware application called !ArcJpeg which forms a front-end for the usual JPEG routines. He comments, "The application seems to work, although it hangs badly saving to the default IDE drive if you haven't got one." Thanks for the warning, Tim!

Fractal Transform™

Stuart Halliday sent into the Archive office information which he had received about yet another image compression system for PC-compatibles, Fractal Transform™. Essentially, it stores images as the complex formulæ of the fractals which would produce those images (I think!). Hence, compression is a complex procedure, but the compression ratio is very high, because the formulæ are much smaller than the data into which they are expanded. Hard-

ware is required for the real-time compression of moving images, but '486/50s are capable of software decompression at up to 30fps at 320×200 pixels. Compression ratios of 40:1 up to 180:1 for still images, and disc requirements of 1.5Mb a minute for video images are quoted. The system is like !Replay, in that it is asymetric with software-only decompression. Typical prices for the bottom end software-only still systems are £500 a time, with the top-of-the-range compression board and software working out at £9,500!

It's tempting to say that the arrival of 600Mb CDs will make data compression redundant – but who five years ago would have predicted that, even with the 1Gb hard discs that are relatively cheap today, people would still want to use data compression techniques to increase their disc capacity? As Murphy's Law *ought* to say, data expands to *exceed* the space available. With JPEG, MPEG, !Replay and Fractal Transform™ offering compression ratios of 10:1 upwards (and consequent savings in disc data transfer rates), I can never see disc capacities being so large as to make data compression unnecessary.

Impression and JPEG

After my reference last time to the use of JPEG files in Impression Style and Publisher, Computer Concepts got in contact again. (I've always found them very helpful, even when I've *not* been wearing my columnist's "hat".) They pointed out that the new Level 2 PostScript printer driver implementation includes support for JPEG files. That is, they can be printed out directly without needing to be decompressed first. Now all we need is the same facility for other printer drivers, starting with CC's HP Turbo Drivers.

Another free disc!

With the help of various correspondents over the past few months, I've now assembled quite a reasonable selection of JPEG files. I've put the best (by my entirely subjective judgement) onto a disc, together with the !FYEO decompression application. If you'd like a copy, please send a blank formatted 800Kb disc in a jiffy bag, with a return label and return stamp, indicating that you'd like the JPEG disc (as opposed to the MPEG disc I offered last time), to me at 23 Ryecroft Drive, Horsham, RH12 2AW. As before, no label or stamp, no disc! If you've never used JPEG before, here's an ideal introduction. To compress files *into* JPEG format you will, of course, need the JPEG shareware disc (Shareware 51).

Memory speeds and performance

Last time, I commented that when using high-resolution 256 colour video modes, the 8MHz memory speed of A300 and A400 series computers seems to degrade overall performance to about 40% of that offered by the 12MHz memory speed of the A5000. (The ARM250 powered A30x0 and A4000 series are not directly comparable – but I'd be interested to receive any comparative timings, *please*.) In response to my aside that when 4Mb upgrades for A310s first became available, there was some talk of 12MHz speed-up kits being feasible, Kevin Moore wrote to report on his experiences: "I have succeeded in doing this on my A440, though not to 12MHz, but to 10.66MHz, mainly because you still require 8MHz for some of the peripherals, so you have to swap the clock between 8MHz and 10.66MHz when the machine accesses the disc or printer... ...The result was that a process which, in mode 12, took 73s at 8MHz, took 52s at 10.66MHz. In mode 28, it took 205s and 99s respectively. When you introduce a 35MHz ARM3, the same test takes 24s and 20s respectively in mode 12, and 53s and 23s in mode 28." Thanks for the information, Kevin. By my calculations, with or without an ARM3, the performance in mode 28 shows a 50 – 60% gain. Quite an improvement!

I've written to IFEL, the makers of my (excellent) 4Mb upgrade, to enquire if a memory speed-up option is still a possibility.

MPEG demo-disc

Requests for the MPEG demo disc are now arriving most days. If you want a copy of that, or of the new JPEG disc, please indicate which you want when you write. The original JPEG disc (Shareware 51) is still available from the Archive office.

With more and more correspondents passing on their experiences, there may well be an MPEG column again next month. Do keep writing – and sending me any interesting JPEG applications or images which you may encounter or produce! A

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Writing a Program for the Archimedes

Francis Crossley

This article will briefly discuss why you might want to write a program, how to choose a language and a few comments on style and structure. In a second article, I will suggest how to start writing a program.

Why write a program?

Presumably, you want to write a program to solve a problem. Probably the hardest and certainly the most important part of writing a program is to define the problem carefully. If there are several parts to be solved, should a very large program that does everything be used or is it wiser to break the solution into several distinct parts, each having its own program? Results from one part could be saved in a file to be read by a second program – for example, this is a useful technique when the intermediate results are of interest in themselves. I do this with teleprinter signals which are recorded using one program and analysed with a second. Different analysis can be done with a third program. This approach means that each part can be fully tested quickly and easily without waiting a long time for complex program to work through to the end.

Which language?

This is a contentious subject so I will stick my neck out and say 'it does not matter!'. It will be useful, however, to indicate briefly what considerations would help us decide on a particular language if several are available.

a) Compatibility with other makes of computer

A Basic program written for the Archimedes would not run on a different make of computer because the program is tokenised (each keyword being replaced by a code which occupies less space and increases the speed of interpretation on execution). The tokens are unlikely to be same on different makes of machine. This problem can be overcome by saving the program as text (spooling it). The foreign machine would then need to accept the program in text form but it is likely that some commands would need to be altered to suit this machine's particular dialect of Basic and any structures peculiar to Acorn Basic would need to be rewritten.

A program written in a standard compiled language such as Fortran, Pascal, C etc can be transferred as a text file to most other makes of computer and can then be compiled (see later) and linked (also see later) and then executed. I did this very successfully using Pascal on a BBC B which I sent to a Prime multiuser mini computer using Kermit (a very useful file transfer program). The Prime then compiled and linked the code ready for execution.

b) Software secrecy

If the program is to be sold, you may not want the purchaser to see the code being used. If the language is Basic it can be read, modified and possibly sold by the purchaser. A compiled language does not have this problem since what is sold is in a machine code which is peculiar to a particular processor and is not readily understood by humans. But this also means that compatibility with other makes of computer is lost. The processor is the part of the computer which does all the work, in the Archimedes it is an ARM2 or ARM3 and is incompatible in every way with the processor used in a PC, for example.

c) Speed of execution

Before looking at the speed of execution, a few words are needed about a fundamental difference between Basic and compiled languages. Basic is an interpreted language which means that as each line in the program is read, the computer converts it into a machine understandable form and immediately executes the command, the next line is then converted and so on. If these lines are met again as they would be in a loop, the conversion process takes place again. This repeated conversion process makes interpreted languages intrinsically slow. However one exception to this is the set of mathematical routines built into Basic which, because of their limited precision are much faster than their equivalent using the floating point emulator.

Languages such as Fortran, C and Pascal are 'compiled' and 'linked'. Compilation is the process of translating statements into machine code. One statement might give rise to many machine code words. (An example of a short C program with part of the machine code is on the monthly disc.)

Linking adds the code you have written to that needed to perform functions such as printing, writing and reading files etc. Compiled languages are intrinsically fast.

The fastest and smallest program is one written in assembly language which provides a way of programming the computer at the level of the simple commands the processor actually executes. These programs are not as easy to write as those written in high level languages because of the huge effort involved in working out every single step needed by the processor. Assembly language is known as a low level language because it involves writing commands which directly affect registers and memory locations. For example, it may be necessary to obtain the screen memory address and write directly to the screen thus increasing the speed of drawing, etc. Some understanding of how the machine works is necessary before using assembly language.

Summary

I use Basic for experiments with programs but for the more serious work I use C. I have used Fortran and Pascal but rather than use all three and worry about which one to use, I stick to one. C and Pascal require a more disciplined approach than does Basic. The choice is really personal unless speed or size of code are important, then you would use a compiled language or assembler. If the techniques for writing a program are known, it is easy to learn and use a new language when required. There are other languages available which have their devotees or are valuable for particular purposes – languages such as Lisp, Logo and database languages. Any language could be used to write almost any type of program but using an inappropriate one, e.g. Basic for a database program, would be harder than using one designed for the job.

Another important advantage of the compiled languages is their improved memory handling facilities, particularly the ability to use structured data types. This allows the programmer to refer to a collection of variables as a single object and makes dynamic data structures easier to build. The only complex structure available in Basic is the array, where all elements have to be of the same type. This rather limits what can be done without accessing the machine at a lower level.

Style and structure

Neither of these is of any interest to the computer or the user. They are of value only to the programmer because adopting a good style and structuring the program will make the program easier to understand when you come back to it, weeks after it has been written and therefore it will be easier to modify. It should also decrease the chances of a minor change in one part of the program, causing catastrophic failure elsewhere.

What is meant by style? I use the word to mean things such as:

1) Meaningful variable names – These make for increased readability. Be careful though that they are not mistaken by the interpreter to be keywords. Calling a data array DATA(i%) is my favourite mistake! Putting upper case letters in a long name helps readability, e.g. NumberOfItems.

2) Consistency – Use the same structure for performing the same operation.

3) Indentation – Indenting statements within FOR loops, IF ENDIF structures, REPEAT UNTIL structures, etc helps to show which parts of the program belong together.

4) Control variables – Some people insist on the FOR NEXT control variable being repeated adjacent to the appropriate NEXT, although indenting the structure makes this less important and it is not required by Basic. I tend to use single letters for the control variable if the loop is short, perhaps presetting an array, and longer names where the structure is more complex and the variable is used for some purpose, such as a comparison.

Structure

This is the idea of breaking the solution into small parts, each doing a clearly defined job. In addition, it is common to 'hide' these parts in procedures placed together in the program. The opposite of structured is what used to happen in early versions of Fortran when GOTO had to be used to implement a choice using a simple IF statement. It then became quite difficult to follow the possible paths through the program. It is believed that one GOTO ruins a structured program but this is exaggeration, we must be pragmatic and write programs which do the job

reliably and are reasonably easy to follow, especially if the program is for our own use.

Acorn Basic has a wealth of features which make writing structured programs much easier:

```
IF ...THEN...ELSE...ENDIF
FOR...NEXT
REPEAT...UNTIL
WHILE...ENDWHILE
CASE...OF...WHEN...OTHERWISE...ENDCASE
PROCDoSomething
FNReturnSomething
GOSUB...
ON...GOSUB...
```

The last two are not recommended since they do not give any clue to what they do. A REM statement could be used but PROC and FN do the same job and can have meaningful names. The CASE statement can be replaced by a number of IF...ELSE IF ... structures and is preferred by some. Most, if not all these structures are present in modern languages, C, Pascal and even Fortran. BBC Basic, of course, has had them for years!

The final part of this article will consider a concrete example of writing a simple program using some of the above ideas. These notes are my personal suggestions, so if you have any comments I would be pleased to see them either in Archive or you could send them to me at 156 Holmes Chapel Road, Congleton, Cheshire, CW12 4QB. A

Help!!!!

• **Brainsoft Multipod Professional** – I can't get this to work under RISC OS 3.1. Can anyone help, please? Tim Hill, 29 Risborough Road, Stoke Mandeville, Aylesbury, HP22 5UP.

• **Calling all ArcTEX Users** – I use public domain TEX software, modified by Graham Toal for Acorn, which works well on my A440 with RISC OS 2. After installing RISC OS 3.1, I have three problems.

(1) I get an error explaining that the TexFonts file cannot be opened. The system crashes so I cannot preview any text.

(2) The texing process cannot access the macro file from hard disc so I have to store copies of the macro file in the directory with the Tex being processed.

(3) When I drag a directory with a Tex file onto the Tex icon, I am informed the .tex file can't be found, although it is where it always was under RISC OS 2.

Are there any other ArcTEX users out there with answers to these problems? I'd really love to hear from you! Toni Beardon, University of Cambridge Department of Education, 17 Trumpington Street, Cambridge CB2 1QA.

• **CD-ROM encyclopedia** – I want to get a good encyclopedia on CD-ROM for the school at which I teach. Acorn/Cumana recommend the Hutchinson one but it got a thorough panning in the educational press so I wonder what real users (as opposed to reviewers!) think about it. Or is there an alternative? Chris Price, Merton Court School.

• **Laser Jet IIIp margins** – I have a Hewlett Packard LaserJet IIIp, and have been frustrated with the broad (13mm) top margin when using the RISC OS 3 printer driver. HP say this should be about 4mm. With advice from Acorn plus a little experimentation, I found that I could get the margin down to 5mm by modifying a line in the file `!printers.lj.resources.messages`. The line, under the heading of paper tray selection strings, reads: `PT_A4:|[&126A`

and this should be changed to:

```
PT_A4:|[&1-13u-177z26A
```

This works well but since using the Computer Concepts HP Turbo Driver, I find that these settings are ignored. Can anybody help please? Andrew Hextall, 119 School lane, Bushey, Herts, WD2 1BY.

• **Red Boxes** – I used the Red Box system on the old BBC Micro but cannot find out if there is any way of getting them working on the Archimedes. Can anyone help, please? Tim Hill, 29 Risborough Road, Stoke Mandeville, Aylesbury, HP22 5UP.

• **Teletext adaptor** – The Morley Teletext adaptor has now been discontinued but we still get an occasional enquiry. A company called Ground

Control used to do a teletext adaptor but we have been unsuccessful at getting in touch with them. Does anyone know where we could get a teletext adaptor? Ed.

Help Offered

• **AI CD-ROM** – Lambda Publications have a few copies of Issue 1 of the AI CD-ROM as reviewed in Archive 7.5 p42. As Issue 2 is now available, they are prepared to offer the Issue 1 CD-ROMs to schools for only £25. Send Lambda a cheque with order and quote your Archive subscription number.

• **Dog & Cat clipart** – I would like to thank all those people who responded to my request for clipart. The response confirms the camaraderie and mutual help which exists between Archimedes users. R E Clark, Gloucestershire.

• **Free computer language** – Lambda Publications have made a very generous offer to Archive subscribers. They are keen, in their own words, "to change the face of educational computing"! In particular, they want to see Scheme used more to teach programming. To that end, they are offering to any Archive subscriber a free copy of EdScheme (reviewed in Archive 4.3 p48 and mentioned in Archive 6.9 p22) to anyone buying a copy of "The Schemer's Guide" from them. Just send them £17.50 for the book (they don't even charge for p&p!) and quote your Archive subscription number and they will send you both the book and a copy of EdScheme. A

Small Ads

(Small ads for **Archimedes** *and related products are free for subscribers but we reserve the right to publish all, part or none of the material you send, as we think fit. i.e. some people don't know what 'small' means and there are certain things, as you can imagine, that we would not be prepared to advertise as a matter of principle. Sending small ads (especially long ones!) on disc is helpful but not essential. Ed)*

• **A3000**, no monitor just a stand, 2Mb RAM, games and software – £200. SyQuest removable 42Mb hard drive with four cartridges £450. WS 4000 modem, Beebug Hearsay £100. RISC OS 2 PRM £30. Z88 with case, 288Kb ram, SpellMaster, zBase, PC link, Archimedes leads, mains adaptor, manual £200. Euclid, Mogul, Splice and Tween, £40. Phone 081-993 2361.

• **A3000**, RISC OS 3.1, monitor, 4Mb RAM, external SCSI controller + 45Mb drive, £500. Phone Bradford 0274-580693.

• **A410/1, 4Mb**, ARM3, 40Mb HD, RISC OS 3.11, Philips CM8833 colour monitor, FaxPack v2.01, Scanlight 256, Laser Direct LBP-8, Impression 2.19. Consider any offer and donate 10% of to Archive charity! Call Frode on (+1) 305-947-8983 9am-5pm or (+1) 305-861-2931 7pm to 5am. This is Miami Beach USA so please remember the 5 hour time difference!

• **A5000** 4Mb/120Mb HD, monitor, software inc Artworks, Impression, C, PC Emulator, ISO Pascal, Beebug scanner, books and mags £1200 o.n.o.. CC Laser Direct expansion card £200 o.n.o. Phone 0744-58404.

• **A540, 8Mb RAM**, 100Mb SCSI hard disc, CD ROM drive, RISC OS 3.1, Taxan 770+, Econet, Watford Digitiser, Hyperactive Junior genlock board, Desktop C and Assembler, PRM, loads of software with full documentation. £2,000. Bedford 0234-750770.

• **Acorn DTP** £30, PRM2 £25, System Delta+ £30, Interdictor £8. Phone 071-703-5675.

• **Acorn Pocket Book** with manuals and Schedule, £120. Phone Coventry 0203-418064.

• **Archimedes A410/1**, 4Mb RAM, RISC OS 3.1, 40Mb HD, 3½" FD, twin 5¼" FD, with Taxan 770+ multisync monitor, manuals, boxed, immaculate condition, offers. Phone Wigan 0942-717454.

• **Canon BJ10e** printer + CSF + 5 black cartridges, £220. PCATS graphics enhancer with manual, £100. Phone 0425-471060 after 6pm or weekends.

• **Ground Control** 4Mb upgrade with 35MHz ARM3 board and MEMC1a for A305/310. Plugs in – no soldering, £250. CC ROM podule with RAM chips and battery backup, £35. Acorn ANSI C v 3,

£50. System Delta+ £25. Phone 051-606-0289.

• **I/O podule** (Acorn AKA10) with analogue, user, 1MHz bus ports, semi-upgraded to Midi, £30. Phone 031-339-6979.

• **PRES A3K6** disc interface for A3000, £25. Cumana CS354 3½" disc drive with PSU, £50. Cumana CS400S 5¼" 40/80 disc drive with PSU, £30. Ground control, A3000 2Mb upgrade (upgradable to 4Mb) £25. All with manuals, all ex. cond., all o.n.o. Phone Ian on 051-678-9879.

• **Risc Developments** Hard disc companion £20. Serial Port Investigator 2 £10, Games: Conqueror, Nevryon, Superior Golf, Zarch £6 each or all 4 for £20. CC ROMS (for ROM/RAM podule): InterChart £10, InterSheet £15, SpellMaster £20. Phone 0737-832159 (eves).

• **RISC OS 2 PRMs** (*with* index cover), Basic user guide, Assembly Language (Dabs), Operating System (Dabs), C (Dabs) all with support discs. ArcScanIII, DT-Talk, I-APL with manual and tutorial. As new £55. Phone Mick Magennis 0742-471049.

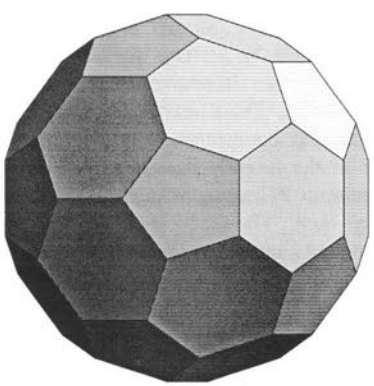
• **SJ MDFS fileserver** for Econet with 20Mb hard disc and matching tapestreamer and 35Mb tapes, £500. Continued manufacturers support still available. Phone 0225-464313.

• **Wanted:** A410/1, 440 or 310 base unit, in reasonable condition. Specification and OS not critical. Please phone Edward Downes on 0242-263805(work) or 0242-528571(eves).

• **Wanted:** Acorn Computing magazine (+ discs if poss) March 1993 issue i.e. Vol. 11 No1. Phone 0751-472285.

• **Wanted:** Morley Teletext adaptor. Model for BBC B might be acceptable. Phone Tony Cowley on 0473-780298. A

Charity Sales – *None this month as we are selling it all at the Open Day on March 12th! If you have unwanted software or hardware for Archimedes computers that you could donate for charity, please send it to the Archive office a.s.a.p. Thanks.*



Make your own 'Bucky Ball' using the PD libraries from 'Fortran Friends'

Easier Fortran77 on the Archimedes

For information on the Public Domain library for the Archimedes, 'Fortran Friends' which includes a Desktop Development Environment and libraries for graphics and Wimp utilities etc, send an electronic mail message via JANET: KMC@UK.AC.RL.ISISE

Now available as 'Shareware Disc 44' from:

Norwich Computer Services, 96a Vauxhall Street, Norwich, NR2 2SD.

Fortran on the Archimedes

Kate Crennell

As a practising scientist, I have used Fortran for many years on mainframe computers. I believe the Archimedes is potentially very useful for scientific research computing in the Universities and Higher Education Institutes, especially since the Floating Point Accelerator is now available. Unfortunately, the scientific market is relatively small and makes difficult demands on the operating system. Apparently, Acorn have taken the sensible business approach and decided that they cannot afford to support Fortran on the Archimedes.

Fortran77 (release 2) is now marketed by Intelligent Interfaces at £99 +VAT. For more details, see the recent article in 'Acorn User' February '94 p33. Intelligent Interfaces are also just completing the documentation for a new product, a window-based 'Front End development system' for use with this Fortran77 compiler.

I have set up a self-help user group known as 'Fortran Friends'. Our aim is to communicate any news of interest to Fortran users, including listing accessible software libraries, and to accumulate a public domain library of routines which we can all afford to use. Further contributions are welcome at any time.

Join us today in lobbying Acorn for a 'Fortran90' compiler, which has many new statements including matrix manipulation and has Fortran77 as a subset.

'Fortran Friends' have so far produced two discs, which have been compressed into one, now sold by Archive as their Shareware 44, since I prefer programming to copying discs.

Disc 1 contains a Desktop Development Environment for Fortran77, which greatly simplifies the compilation and linking stages of program development. In addition, there are fast Binary input/output routines, graphics, SpriteOp and Wimp low level libraries with extensive documentation and test examples. As well as the low level graphics library, there are higher level routines in Fortran which allow the saving of the picture as a drawfile, draw a simple x/y graph, 2D contour lines and a 3D surface. There is only the source on this disc, so you need a copy of the Fortran77 compiler to see their output. The two large sample applications, SphereRot and WimpPoly, are given in both source and executable form with a few examples of datafiles.

The disc is intended for scientists, already familiar with Fortran, who wish to embed the graphics into their own scientific programs. The example source code is mainly intended as an illustration of how to use the graphics libraries, not to form complete packages.

Disc 2 contains the complete !WimpPoly, a fully RISC OS (version 2 or 3) compliant application, which draws two views of a polyhedron – a 3D solid shaded one or a planar net. There are datafiles for drawing over 140 polyhedra and drawfiles illustrating all the polyhedra.

I hope that WimpPoly will prove useful to both research scientists who write in Fortran and science and mathematics teachers in schools who are interested in polyhedra. Models of the polyhedra can easily be made by printing the planar net on stiff paper; they make decorative additions to any classroom or office. There has been increased interest in the truncated icosahedron lately, because this is the shape of the recently discovered form of carbon, Buckminster Fullerene, more familiarly known as a 'Bucky Ball'. The data comes from the public domain and I am asking anyone with co-ordinates of an interesting polyhedron to contribute them to the library.

Interested academics can contact me via the Joint Academic Network, JANET, where my full address is KMC@ISIS-E.RUTHERFORD.AC.UK or the abbreviated form (within the UK only) KMC@UK.AC.RL.ISISE.

There is now a Higher Education Software Archive, (Hensa) with many useful programs for the Archimedes. For details, send a message to: hensa@uk.ac.hensa.micros. A

Hints and Tips

• **A4 battery life** – Many A4 users may have noticed that the charge of the A4 battery becomes shorter after each recharge. Apparently, if the battery is not discharged completely it does not run for the full capacity upon recharge. One solution is to unplug the battery manager from the command line and leave the computer on until the red light stops blinking. The battery will then be fully discharged and can then be recharged as normal.

I now leave the battery manager unplugged permanently. I just have to make sure I save everything regularly. When the red light flashes to indicate the battery being flat, I have a couple of minutes to save the latest alterations and shutdown. Awie Bosman, South Africa.

• **Beware the old module!** – I have discovered that some older (slightly badly-behaved) applications load their own modules in their Run file. Presumably this is because RISC OS 2 didn't have all the modules in ROM and an application needing a module newer than the RISC OS 2 one would need to load it itself – if it was too lazy to use SysMerge, that is. If you have RISC OS 3, these applications can have the disconcerting effect of replacing a RISC OS 3 ROM module with an older version of the same module.

I came across this when trying to run Almanac – I got the error message "Module .....$.!System.FPEmulator not found". Looking into System confirmed that there was no such module under this pathname, and several minutes of panic ensued while I played 'hunt the module'. Finally, a hard reset seemed to restore Almanac to perfect behaviour, the module was restored and I was so relieved that I forgot about the problem for some weeks.

The problem recurred but this time, Ovation would not run either, giving a similar message. I realised that, in RISC OS 3, FPEmulator is in ROM, so something must have happened to the ROM module. On checking *Help ROMModules, I found FPEmulator was "Dormant". Trying to *RMReinit it had no effect. Then I remembered that I had been playing CIS's Mah Jong. Sure enough, in the application directory was a copy of FPEmulator and in the Run file was the line "RMLoad <obey$dir> FPEmulator". Inspecting this module showed it to be version 2.60 (the ROM module is 2.87).

In the Almanac Run file is the line "RMEnsure FPEmulator 2.70 Error You need FPEmulator 2.70 or later". So, Mah Jong had been quietly loading an old module without this being at all obvious until another application wanted the ROM version. Deleting the line from Mah Jong's Run file cured the bug but Mah Jong seems to get along only intermittently with the new FPEmulator, unpredictably throwing up "invalid floating point operation" errors. (Should it do this? What about "backwards compatibility"?) Putting "RMKill FPEmulator" followed by "RMReinit FPEmulator" at the end of Mah Jong's Run file doesn't have any effect, but running the same two lines in a separate Obey file does work. Does anyone know why?

The moral would seem to be to inspect the directories of applications you have been using if your modules start misbehaving. They may be loading all sorts of things you don't want. Peter Young, Cheltenham.

• **Computer hang-ups** – There's a hint in Computer Concepts' Turbo Drivers manual which suggests that if the printer should 'stall', selecting <f12> followed by <return> will re-start the printer.

Quite by chance, I found that doing the same thing can occasionally clear a computer hang-up. Specifically, it may work when you can still move the mouse pointer but clicking on an icon, etc has no effect.

The beauty of this is that, rather than having to perform a soft or hard reset to clear the hang-up and thus losing any unsaved work, you are returned to the desktop as it was before selecting <f12> <return>, i.e. all windows and documents are restored. Jim Nottingham, York.

• **!FontEd under RISC OS 3.1** – Ronald Alpiar's problem of invisible coordinates in last month's Help!!! (7.5 p8), apparently only occurs in 256 colour modes. In 16 colours they reappear.

(I think this could be linked with an obscure problem which one of our subscribers has reported to Risc Developments. When using Ovation in certain 256-colour screen modes, inverted text, i.e. white on black, becomes black on black! Risc Developments say they have a partial solution and are working further on the problem. Ed.)

• **Keystroke hints** – I've just started using Keystroke myself, in earnest, and, quite frankly, it is *brilliant!* It will save me huge amounts of time with all the text editing I do from day to day. For example, contributors often say, *"Press the menu button to do such and such"* instead of *"Press <menu>... "*. I now click on "the" and press <alt-f6> and the change is made at a stroke! It is done by making the key insert the text `|D<60>\S-⇨\\⇦\<62>|D`. The <60> and <62> have to be used to create the triangle brackets which, as a beginner to Keystroke, confused me for a while.

I find Impression's <shift-ctrl-Q> useful for inverting charactres (sic) – a very common typing error! However, I sometimes need to change "to boldly go" into "boldly to go" (yuk!) so I produced a key, <alt-Q>, to invert adjacent words by using `|D\S-⇨\|V` – simple but effective – just put the cursor somewhere in the first word and click <alt-Q>.

I often have to delete a comma when someone has put one in the, wrong place. So <alt-\> generates the string `\S-⇨\\⇦\|?` which moves to the beginning of the next word, back one space and then deletes one character. This has the effect of deleting the final character of the word in which you have just clicked, so it could also be used to change a plural to a singular. The only time this falls down, of course, is when the next word is separated by an extra character like a bracket or somesuch.

These special keys may seem a little unnecessary but to someone who does as much editing as I do every day, they can save quite a bit of time.

Finally, in the days of programmable function keys on the old BBC Micro, I used to use `|[` to generate an <escape>. This seems to work OK with Keystroke and avoids having to use `\ESCAPE\` in a text string. I remember it because the [is like an E for escape. Ed.

(There are a huge number of time-saving tricks that could be done with Keystroke, so do send in your own Keystroke hints & tips. Ed.)

• **Resultz and Continental numbers** – I have just discovered a feature offered by Resultz which should delight Continental spreadsheet users. The sixth number format in the list offered by the style editor, which looks so strange with its character combinations ",." and ".," actually is used to replace the English way of writing numbers with the Continental one, so that a number like 3,500.50 will appear instead as 3.500,50! Jochen Konietzko, Köln.

• **RISC OS !NewLook** – Now that everybody has had a chance to play with the new look desktop as distributed at Acorn World 93 (and numerous other sources), we would be interested to hear what you think of it. Do you use it? If not why not? Does it do everything it should? How does it compare to other user environments (e.g. Windows 3.1, NeXT)? What would your ideal RISC OS 4 desktop look like? Please write to Archive with your comments.

• **Schedule and Spell (Pocket Book)** – There seems to be no mention at all of Spell in any of the manuals, except for a section in the User Guide on how to spell-check in Write. The Schedule release note says that "this replaces the Spell application supplied with your Pocket Book", but does not tell you that you shouldn't delete Spell before installing Schedule. If you do this, as I did, you find, somewhat oddly, that you can check spelling in Write but that you can't save to the global dictionary – you can't, of course, use Spell as a free-standing application because it isn't on the Desktop. If you reinstall Spell, from whichever drive you have Schedule in, all works as it should, though you have to learn how to use Spell from the Help facility, which is very good.

Nowhere seems to make it plain, however, that to use document dictionaries, you have to enable this from the Setup/Install menu in Spell. Incidentally, document dictionaries are not kept in the WRD directory with "the same name and in the same directory as the document, but with the file extension D$S", as the manual says, but in a separate D$S directory with the same name as the document. Peter Young, Cheltenham.

• **Style – Changing date and time formats** – Impression Style allows the current date or time to be inserted into a document. By default, Impression Style enters '25th January 1994' for the date and '6:52:13 am' for the time. Both formats may be changed quite easily. You can have several different date and time formats stored and swap from one to the other while you work.

The date is inserted in one of three ways.

• By pressing <ctrl-shift-D>

• By clicking on the insert icon on the tool bar and clicking on Current date

• From the menu: Utilities->Insert->Current date

The time is inserted in one of two ways

• By clicking on the insert icon on the tool bar and clicking on Current time

• From the menu: Utilities->Insert->Current time

The format used for the time and the date is stored in special system variables called Style$TimeFormat and Style$DateFormat. These variables are not mentioned in the printed manual and are given wrongly in the early versions of the on-line help as Impression$TimeFormat and Impression$DateFormat. If the user does not set these variables, the !Run file sets them automatically.

To set the variables, find your RISC OS 3 User Guide and find the section on System Variables. This gives a table explaining (not very well!) how to set the time and date variables. There isn't space here for a tutorial but the Impression Style defaults are written `%z12:%mi:%se %pm` for the time which appears as '7:27:07 am' and for the date, `%zdy%st %mo %ce%yr` which appears as '25th January 1994'.

You can reset the two system variables temporarily as follows: press <f12> and type, for example, `Set Style$TimeFormat %z24:%mi` then press <return> twice to return you to the desktop. Now insert the time in an Impression Style document and you should get the current time in the format '7:30' instead of '7:30:01 am'.

The "time" doesn't have to be confined to the time – you can add the date to the time format just as you can add the time to the date format. So you could use the "time" and the "date" as two different versions of the date.

When writing letters I like <ctrl-shift-D> to give me '25th January 1994' but when I am writing notes from the telephone, which I do a lot, I like to date and time stamp them so I prefer '7:36 Tue 25 Jan 94'. This means that you can have a keyboard shortcut for entering the time combined with, or instead of, the date.

To do this, you just need two Obey files. Load !Edit from the Apps icon. From the Edit menu, choose Misc->Set Type and then delete the offered `Text` and enter `Obey` and press <return>. Into the edit window type:

```
Set Style$DateFormat "%z24:%mi %W3
                      %zdy %m3 %yr "
```

Press <return> and save the file to disc calling it `DateTime`. After you have double-clicked on this file icon, you should see the current time and date in the format '7:36 Tue 25 Jan 94'.

You now need another similar file to restore the default. Create another Obey file in Edit and this time it should say simply:

```
Set Style$DateFormat ""
```

When Impression Style sees that the variable is set to null, it uses the format in the !Run file. Save this file, preferably as something meaningful like DateDeflt.

Now store the two files on your Pinboard so that you can double-click on whichever format you want.

If you want to change the format automatically, as Style loads on start-up, put a line in your !Boot file, after Style is loaded, to set the system variables mentioned above. If you want to change the default format permanently, you can amend the !Run file in Style though this is not normally recommended and you should always keep a backup copy of the original !Run file. If you don't know where to find the !Run file, or how to alter it, it's probably best not to do it! Paul Lewis, London W3.

• **Style – Saving files as documents** – Impression Style allows files to be saved as documents rather than directories. The advantage is that a document takes up far less space than a directory. If you store files compressed, perhaps as a backup, a file can be compressed much more efficiently than a directory.

There is no utility to go through your entire hard disc to convert all those space-hungry directories

into files, but you can convert them as you use each directory quite simply. Load a number of the old-type Impression documents – Style will warn you that the document is in an old format and may warn you about things it can't convert or find. Remember that instead of clicking on OK to these warnings, you can just press <return>.

You can load up to sixteen documents, memory permitting. Click in the top document and press <ctrl-shift-Y>. That toggles the file save routine to save the document as a file rather than as a directory. Press <f3> then <return> to save it. Although its name still begins with a '!', it is now a file and not a directory and will have the Style icon instead of the old 'I' icon.

Now press <ctrl-f2> to remove the document from memory and then go through the stack of documents in the same way. It's not automatic but it is quite quick. How much you save will depend on your disc filing system but I saved about 14Kb per document. Documents *can* be stored as files but long documents might be best left in the old format, especially ones that are so long that you have to load and edit chapters separately to fit them in memory.

If you have a backup of your hard disc (and if you don't, start one now!) you may find that RISC OS will not overwrite a directory with a document of the same name. The answer is to alter a system variable called Copy$Options. To do that, press <f12> and enter `Set Copy$Options F` then press <return> twice. That should force RISC OS to overwrite the directory with a file when you backup. There is more on these options for copying in the User Manual under *Copy. Paul Lewis, London W3.

• **Tables** (again) – I often have to make up tables and have always been frustrated by the fact that wordprocessors work essentially in lines while data for tables usually comes in the form of columns. It would be great to be able to pour the data into the WP side by side.

The only way around it that I have found within Impression is to generate sufficient side by side columns. If you want a master page to do this, make one with the requisite number of columns and then unlink them by cutting and pasting them back with the same co-ordinates and dimensions.

An easier way, particularly for numerical tables but also for text, is to assemble the tables in a spreadsheet which will accept column data and then transfer the finished arrangement back to the WP in the form of a CSV file of the block of data.

I use Schema which is particularly amenable in that CSV files of data can be input just by dragging them onto a marker and columns (data separated by returns) will load as columns. It is not necessary to do any more than ensure that the sheet is large enough to take the longest line/column. If the basic CSV input filter is set on Impression, all the commas will be converted to tabs and you get an instant table by applying a suitable table style. The input filter, CSV+, in the Business Supplement will automatically generate tables for the non-table literate – in a somewhat complicated way! Bob de Vekey, Watford.

• **Time errors (continued)** – Further to Matthew Hunter's item on time errors (7.4 p51), the situation is actually significantly more complex than described. The CLib time commands will not give the correct answer if the cumulative effect of TimeZone and DST (e.g. BST) is negative. Setting TimeZone to zero is not going to be a valid solution if you don't live in the UK.

I encountered this problem some time ago during the development of ArcTrack. The problem is particularly acute in this case since the program needs to know both UTC (for the orbital mathematics) and Local Time (to display to the user). I will attempt below to describe the solution which I developed. It may not be the simplest general solution but it solved my particular problem.

This first code fragment determines the difference between local time and UTC in seconds. It will be necessary to make a new copy of swi.h for RISC OS 3 if this has not already been done. The SWI_List program provided with the compiler will achieve this.

```
#include "os.h"
#include "swi.h"

int utc_offset ()
{
  int temp;
```

```
  os_swi2r (Territory_ReadCurrentTimeZone, 0, 0, (int*) NULL, &temp);
  return temp / 100; /* Output of SWI is in centiseconds */
}
```

The secret of extracting the correct current value of UTC time is to use os_word 14, thus:

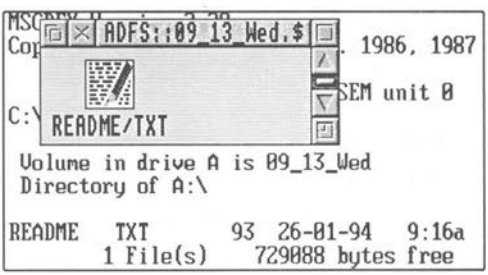
```
#include "os.h"

double utc_time () /* Would be significantly simpler if long ints were 64 bits */
{
  struct five_byte {unsigned int a, b; }

  double un_int = 4294967295.0;
  struct five_byte now = {3, 0};
  os_word (14, (void*) &now);  /* Determine current UTC time */

  return((double) temp.a + (double) temp.b * un_int) /100.0;
}
```

The value returned is the number of seconds since 1st January 1900. Of course, this is not the same as the time_t values returned by the CLib 'time' function. To convert to time_t values, you could assume (correctly) that they are unsigned integers representing the number of seconds since 1st January 1970. Just remember that, under ANSI C, this simple representation is not guaranteed and Acorn are perfectly entitled to change it in future compiler releases. R C Simpson, Farnborough.

• **Writing extensions to PC Discs** – Some people have had difficulty writing to PC discs and giving a file an appropriate extension that a PC will be able to read – the infamous README.TXT file, for example. RISC OS 3 gives desktop access to DOS discs but it makes the discs appear as a standard RISC OS disc. The only way to tell that it is different is to check the size using *free* or *current format* from the floppy disc iconbar menu.

The problem arises due to the different way in which RISC OS and DOS use directory specifiers. DOS uses the '/' character to specify a subdirectory whereas RISC OS uses the full stop. The DOS path "SOME/DIR/STRUCT" would be "SOME.DIR.STRUCT" within RISC OS . Therefore, if you try to write the file README.TXT to a RISC OS disc, what you are actually trying to do is save the file TXT into a directory called README – which probably does not exist.

To write a file with an extension, use the '/' character, e.g. README/TXT. This can be a little confusing because, if you write the file to an Acorn formatted disc, the '/' character will be part of the filename but if you write to a DOS disc, the file will be saved as 'README' with an extension of TXT. The screenshot below shows the RISC OS directory display and the PC Emulator directory showing that the file does appear with an extension.



Many save boxes will only allow you to use names of up to 10 characters – this therefore limits you to a six character filename (with a four character extension "/XXX"). However, the DOS filer within RISC OS will allow you to rename a file to eight characters, giving a total of twelve.

It should also be noted that if you copy a file from a DOS disc to a RISC OS disc and back again, the extension may change. This is again due to the name length restrictions. README2.TXT would be copied as README2/TX for RISC OS . When copied back to DOS, the file would therefore be README2.TX. Matthew Hunter, NCS. A

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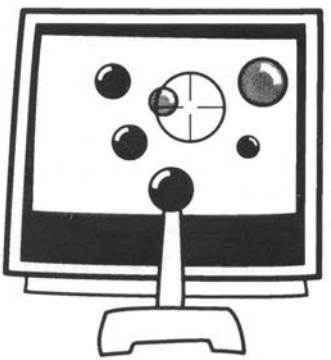

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16-bit Digital Audio for Archimedes – Part 1

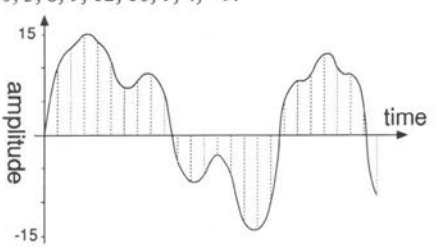
David Lenthall

Since the Archimedes was first released, I have been waiting for some professional musical applications, to match what is available on most of the other computing platforms. For example, SoundTools on the Mac (16-bit sampling h/w and s/w) or SoundBlaster on the PC (Midi synthesizer). There was Armadillo's A616 16-bit sampling card for the Archimedes a couple of years ago, though it was expensive, hogged the machine (RAM and processing time) and consequently never really sold. Now, like the proverbial bus, along come three 16-bit audio cards all at once, with a fourth one also in sight.

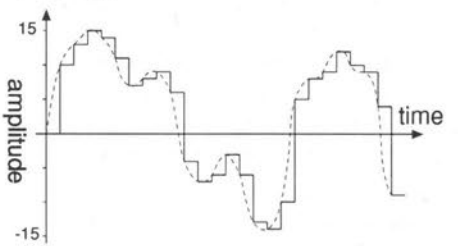
Before looking at these new products, I want to go over some of the theory and possibilities, so that we are better armed to judge how these products shape up in the light of a potential purchaser's specific requirements. To give some idea of where we are headed, the products which I will cover next month, fall into two categories – audio samplers and wavetable synthesizers, with two offerings in each category. But first the theory.

Audio sampling

To get a representation of sound into a computer, the electrical 'analogue' of sound which is used in consumer audio equipment must first be converted to digital form. This task is performed by an Analogue to Digital (A-D) converter. The term "sampling" is used because the output of an A-D converter is a series of samples of the instantaneous value of an audio waveform. The waveform shown below has been sampled at 26 regularly spaced intervals. For this example, the output of the A-D would be the following series of numbers: 0, 10, 13, 15, 14, 11, 7, 8, 9, 6, –4, –7, –6, –3, –6, –13, –14, –10, 5, 8, 9, 12, 10, 9, 4, –9.



The reverse process, Digital to Analogue conversion, would convert this sequence of numbers to produce the output shown below. It is necessary to feed the digital data to the D-A converter at the same rate as the original sampling frequency, otherwise the output will be transposed in pitch, compared to the original. The original waveform is shown by the dotted line, and it is immediately apparent that the output of the D-A is different to the original signal, as it is now a stepped waveform. Things can be improved a bit by passing the output signal through a low pass filter, to smooth the corners, so to speak. It can also be seen that the output is very slightly delayed (by half the width of a sampling step).



There are two main factors determining picture quality on a screen: the use of a higher resolution in both pixel size and the number of colours assignable to each pixel. When dealing with sound, the factors become sampling frequency and word size. So, we can improve the audio fidelity by:

a) taking the samples at closer intervals, i.e. using a higher sampling frequency (analogous to using smaller pixels).

Without delving into the maths, there is a law (Nyquist's theorem) which states that the sampling frequency should be at least twice as high as the highest frequency which is to be captured. The CD standard uses a sampling frequency of 44.1kHz, which gives a maximum theoretical audio bandwidth of 0 – 22.05kHz, though more realistically this would be 0 – 20kHz, at best.

b) using a larger word size for each sample, i.e. more bits per sample (analogous to a larger colour palette).

8-bit sampling means that there are 256 (2^8) possible values which can be assigned to each sample. This would give a dynamic range of 48dB. 16-bit sampling gives 65536 (2^{16}) possible values, which corresponds to a dynamic range of 96dB. Incidentally, in the example illustrated above, the range –15 to +15 roughly equates to 5-bit sampling ($2^5 = 32$) and would provide poor audio fidelity.

Although both of these steps improve the quality of the process, the down side in each case is the greater requirement for RAM. Sample twice as often and there are twice as many samples to be stored, and each 16-bit sample requires two bytes as opposed to one byte for an 8-bit sample. Taking stereo samples will also double the requirement – each stereo 16-bit sample requires four bytes of storage. CD standard sampling requires $2 \times 2 \times 44100 = 176{,}400$ bytes/s.

The normal DAT standard (16-bit, 48kHz) requires 192,000 bytes/sec, whereas the low bandwidth DAT standard (16-bit, 32kHz) requires 128,000 bytes/s.

It is useful to be able to sample at a number of different rates so that the user can trade off quality against RAM requirements. For example:

- 44.1 or 48kHz/16-bit for high quality, but hungry on RAM,
- 11kHz/8-bit for telephone quality speech, but economical on RAM,
- 22kHz/16-bit as a happy compromise.

If you want to sample instrument-type sounds to be played by Midi commands (i.e. at various pitches), then variable rate sample playback is required so that the sound can be transposed precisely in semitone steps and preferably over a wide range.

Summarising in Hi-Fi terms, the sampling rate determines the frequency range and the sample word size determines the dynamic range.

An important aspect of the hardware design is to restrict the upper frequency of any signals allowed into the A-D stage so as to prevent an effect known as aliasing, which manifests itself by producing harmonically unrelated frequencies, i.e. a horrid noise. A low pass 'aliasing' filter performs this task, and its cutoff frequency should vary proportionately with the sampling frequency, to filter out any frequencies higher than the nyquist frequency (half the sampling frequency).

A matching low pass filter is also used at the output of the D-A converter, to ensure that none of the sampling frequency components appear in the output signal.

Direct to disc recording

So far, we've covered the processes of capture and playback but, with CD standard sampling requiring over 170kb/sec, 1Mb of RAM is only sufficient for just under 6 seconds of stereo sound. As RAM is a limited quantity, it makes sense to consider the idea of sampling direct to (and playing back from) hard disc. This means that the length of a sample is limited only by the free disc space, e.g. a 105Mb syquest cartridge could hold about ten minutes of stereo sound – much more useable. A rough guideline is 10Mb per minute of CD quality stereo.

Hard disc recording is revolutionising working practices in professional recording studios, replacing both analogue and digital tape mediums for editing operations, primarily because of the benefits of random access (tape is, by nature, serial) and zero generation loss within the digital medium.

Hard disc recording software mimics the user interface of a multitrack tape recorder, providing 2, 4 or 8 tracks of audio – similar to the Arrange modes found in many Midi sequencers. All the elements of a composition can be saved to hard disc as separate 'soundfiles'. The software, by means of a 'playlist', enables you to specify which (and when) soundfiles are to be played – a sample sequencer, basically.

Digital in and out

Many CD players have a digital output socket and most DAT recorders have both digital input and output sockets. The most common interface standard used is the Sony/Philips Digital Interface (S/PDIF). This uses phono (2-wire) connectors and thus carries a serial data stream.

The provision of S/PDIF connectors on an A-D-A card enables digital sound to be captured directly into the computer (e.g. from a CD player) without having to pass through the A-D stage, and thereby ensuring optimum sound quality.

Although DAT recorders are not exactly household items, anyone working professionally with audio will almost certainly be able to lay their hands on one, even if they don't personally own one. In conjunc-

tion with a S/PDIF connector and suitable software, a DAT recorder can be used as a tape streamer for hard disc backup. A 2 hour DAT tape costs under £10 and can hold over 1Gb of data!

Private sample RAM

This refers to RAM present on the A-D-A card which can be loaded up with sound samples (from disc or the analogue input). The advantage is that samples can then be played from this RAM without putting any load on the ARM processor or disc system. The disadvantage is that because any such RAM is not directly visible to the ARM processor, samples cannot be edited whilst in this private RAM. To perform any editing on the sample(s), you would have to load it into main user RAM, and then transfer it into the private sample RAM once editing was completed.

Wavetable synthesis

Most modern synthesizers use a variation on the technique of wavetable synthesis, whereby a selection of different wavetables (samples) are provided as a tone palette. These wavetables can be combined in various ways (superimposition, cross fading, etc) and processed to produce new sounds (voices).

The wavetables can be in ROM or private RAM, or even in main user RAM or on disc, though the former two are preferable for the reason mentioned above. ROM may not seem an obvious choice as its contents are fixed, though it can be a cost-effective way of providing a wide range of sounds which are always available. Even better if the sounds are General Midi (GM) compatible.

GM compatibility is a Midi standard aimed at multimedia applications. It applies to sound generators (synthesizers) and is therefore a possible option for the two synthesizer cards looked at later, whereas it is not applicable to the purely sampling cards. The GM protocol dictates what sounds should be available, and their respective voice numbers, so that whatever brand of GM device you are using, you can be sure that Midi voice number 1 will always be an acoustic grand piano, and that voice number 14 will always be a xylophone, etc. GM specifies a total of 128 voices, plus a further 47 drum sounds. The drum sounds are accessed via Midi channel 10. To make a legitimate claim of GM compatibility, a sound generator should also have a minimum of 24-note polyphony, i.e. it should be capable of playing at least 24 notes simultaneously.

Another term associated with synthesizers is 'multi-timbral'. This refers to the number of different sounds (timbres, not notes) which can be played simultaneously. For GM compatibility, 16-part multitimbrality is required.

Given the large amount of disc space required for music in sample form, the alternative use of GM standard MidiFiles with a GM standard synthesizer for applications requiring musical output makes a lot of sense, as MidiFiles are of a much smaller size.

Digital signal processing (DSP)

This involves applying algorithmic processes to digital sound (or video) data, transforming it in all sorts of ways. Some of the possible effects relevant to sound data are:

• **Delay/echo** – In the real world, an echo is the result of a reflected sound wave, and is heard as a distinct repetition of the original sound which may then repeat in a series of decaying reflections.

• **Reverberation** – This is the myriad secondary reflections which bounce between hard surfaces in an enclosed space and is perceived as a blurring and extension of the sound. If you stand in a bathroom and clap your hands once, reverberation is the ringing sound which follows the slap of your hands. Emulation of this effect is quite difficult as there are possibly thousands of separate closely spaced echoes, diffusing into one another, to deal with.

• **Pitch transposition** – This is accomplished by using a different sampling frequency on playback from that used when the sample was recorded. Play back twice as fast and the output will be transposed up by an octave, although the sample will then last only half as long as the original. The more advanced algorithms repeat or omit sections within the waveform to reinstate the original duration.

• **Time stretching** – This is the inverse of the more advanced form of pitch transposition, in that the duration of a sample is changed whilst retaining the original pitch.

• **Vibrato** – This is pitch modulation, and is achieved by cyclically varying the sample playback rate about its nominal value.

• **Chorus** – This produces an ensemble effect, whereby a solitary instrument can be made to sound like more. When two or more musicians play the same musical phrase on similar instruments, their precise timing will vary. This is one of the reasons for the richness of real music compared to raw electronic music. A chorus effect is used therefore to partly overcome this shortcoming with electronically generated sounds.

• **Phasing/flanging** – These are similar to chorus except that it has a slower 'movement' to it. Difficult to describe in words, the effect became popular in the 60's as a 'psychedelic' treatment. (The drum treatment on "Itchycoo Park" is a fine example.) Flanging is generally a deeper effect than phasing.

• **Level compression/expansion** – This is a process which affects the dynamic range of a piece of audio. Often a threshold value can be specified, above or below which no change occurs.

• **Digital filtering** – Filtering involves affecting the spectral content of an audio signal. The main advantage of digital filters over their analogue counterparts is that they can be designed to have mathematically perfect characteristics, such as a precise cutoff frequency with sheer slopes, which does not affect frequencies immediately adjacent to the target frequency. Also, the characteristics of the filter are entirely dependent on the particular algorithm used, and thus are programmable.

Some of these operations are fairly processor-intensive and could not be performed by the ARM processor in real time, let alone whilst maintaining a responsive WIMP interface. Cue the DSP chip.

The DSP chip

A DSP chip is essentially a microprocessor whose command set has been optimised for signal processing applications and which has a high degree of internal parallelism. They generally pack a fair bit of punch, 50MIPs+ not being uncommon. They also have a larger word size than most general-purpose processors – 56 bits being common, though some having 96 bit registers.

They enable the type of effects I have just mentioned to be applied to the digital sound data, in real-time, whilst recording or replaying a sample. With some clever programming, they can even produce a number of such effects simultaneously.

This real-time processing ability allows the use of non-destructive editing in HD recording software.

Low level software

So far, I have outlined the main theoretical and hardware aspects, though the potential of any hardware add-on is largely dependent on its system firmware. Areas of low-level software support which I consider to be highly desirable in the context of an A-D-A card, are:

• Facility to sample (record) direct to hard disc.

• Facility to play samples direct from a hard disc.

• Interception of Midi SWIs, both incoming and those being sent out by, for example, a sequencer, to activate (play) samples direct from hard disc or from private sample RAM if available on the card.

I have described these features as low-level software because, ideally, they would each need to operate as background tasks, without unacceptably degrading the general WIMP performance.

Application software

The following is a list of some typical applications which are made possible by an A-D-A card:

• Replay and other multimedia applications requiring soundfile playback with higher quality than is possible using the internal sound system – somewhat akin to upgrading your telephone to CD quality.

• Sample editor (e.g. AudioWorks). As well as the cut & paste, trim and normalise type operations, this may also include facilities for applying DSP-type effects. It would be handy if it could be used to create Replay format sound files.

• Integrated HD recorder/Midi sequencer, i.e. a sequencer which is capable of concurrently running two or four tracks of digital audio, in addition to its usual 16, 32 or whatever, tracks of Midi data.

• Wavetable synthesis management, providing librarian facilities for sounds designed by the user, as well as the means to design the sounds in the first place.

Rounding off

This month I've covered most of the relevant theory and, hopefully, whetted your appetite a little as to

the possibilities. If there are any relevant aspects which are still unclear, please write to me via the Archive address, and I will answer your queries as best I can. Next month I'll give a preview assessment of four of the up-and-coming products that fall into the 16-bit audio category. A

Oak PCB

Bevis Peters

Oak PCB is a CAD package for the design and layout of printed circuit boards. It comes with three discs: the OakPCB program, a copy of DrawPrint and DrawPlot, two libraries of pre-made circuit symbols and a Helvetiplt font. The manual is a well laid out 58 page stapled A5 booklet, including a thorough index.

The program

When I first ran the program (by double clicking on the OakPCB icon) after my usual !Boot sequence, the whole machine crashed. I finally tracked this down to a "free RAM" display program, and without that it started up fine. It installs itself on the iconbar, taking up 352Kb of memory initially, with a configuration menu available which allows various preferences to be set, for instance the size of the PCB to be made, the grid size and colour, etc.

Clicking the iconbar icon opens up three windows; the main PCB display window, a tools window showing the various items that can be placed on the PCB design, and a Layers window which shows which layer is currently being worked on.

PCBs are often made with multiple layers for the wiring, and OakPCB allows for this, with four layers available for the laying of wire tracks. The other layers are a "silk" layer – used for writing information, i.e. component values, manufacturers name, a "drill" layer for marking the drill holes and a "solder resist" layer for laying down areas which do not want to be covered in solder in flow soldering. Obviously, only one layer can be worked on at a time but any combination can be viewed and all are colour coordinated to distinguish between them. This does need a minimum 16-colour mode.

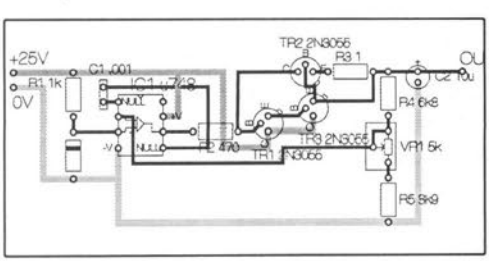
By clicking on one of the tools in the tools window, that item can be placed on the PCB. A comprehensive set of tools is available, including solder pads, tracks, through PCB holes, text and "silk" layer drawing aids. Each tool has its own associated menu which allows various aspects of the tool to be changed, such as the diameter of holes, the number of pins and width of a SIL/DIL socket, the track width and the font and direction of written text. Obviously, some tools are only used on certain layers, e.g. text is only used on the silk layer. The documentation suggests that the included Helvetiplt font is used, and that is a good option since it is very fine. Anti-aliasing is not used, although the fonts can be drawn as either an outline or filled solid, and in any direction. Be warned, however, that some fonts cause dire errors along the lines of "No RGB value set for font" – not fatal, but a terrible hassle.

Some Draw-like tools are available for drawing on the silk layer – open/closed lines, boxes and circles.

Items can be selected by clicking with the "select" tool set in much the same way as in Draw. Selected items can be grouped, moved and rotated through 90°, although not resized. Grouped items can be given a name, so a schematic for a 741 op-amp can be designed and then called "741" for referencing.

The manual includes a run-through of a PCB design – a Darlington pair – which is informative and easy to follow. It covers all the points in enough detail to be useful without being tedious. I used the program to design a PCB for a voltage regulator quite happily, and found correcting mistakes very simple.

Files can be saved as either OakPCB files, full colour drawfiles or CSV hole position files, which is basically a list of all the drill hole positions relative to some chosen point.



The files can only be printed with the included print/plot program. For driving a plotter, the need for this is more apparent, but with my BJ10e, I achieved the same results by just printing the equivalent drawfile. Their program does allow the position of the printing to be set more accurately, however.

The two libraries – !PCBlib and !Schemlib – contain dozens of pre-made components for easy placing on PCB designs.

Overall, I found the program easy to use, although I did not actually build the PCB I designed. Having never used any other commercial PCB design package, I cannot compare it in performance, but for the small electronics business, or just the active hobbyist, OakPCB is worth getting as an alternative to hand design.

OakPCB has recently been reduced in price. It now costs £70 +VAT from Oak Solutions or £77 through Archive. A

TechWriter Update

Brian Cowan

My recent review of TechWriter seems to have attracted much correspondence.

Text beside a graphic

Interested readers will recall that my main criticism concerned the difficulty of running text around graphics. Since TechWriter is fundamentally a word processor (i.e. text-based rather than page-based), all graphic objects are embedded in the text and they will therefore move with the text if anything is added above. So, text will be expected to remain beside a graphic even when the text above is edited. This is in contrast to a local frame in Impression where the frame is fixed on the page and text really does flow around the frame.

Since the text beside a graphic in TechWriter is fixed, it can be incorporated into the graphic object itself. In fact, one of the TechWriter calculus example files does this. The clever point which I missed, but which a number of readers wrote in to tell me, is that a figure "caption" is not limited to one line. This can be the text beside a graphic and it can be as big as you like. So there really is no problem.

Save as Draw

In the review, I explained about the facility to save an area of a TechWriter document as a drawfile. This is useful for a number of applications, although it would be better if saved as a tagged drawfile containing the original Techwriter information. One particular use for saving as Draw is to export equations. You could therefore use TechWriter as a superior sort of Equasor to create equations for Impression documents or whatever.

New facilities

My review in Archive 7.3 was really of TechWriter version 1, with a preview of what version 2 would provide. Currently, version 2.01 is shipping and that has some more facilities added. Background printing is provided and more commands have been added to the button bar. A useful hint concerning the button bars is to have Acorn's interactive help application running. Then it will tell you what the buttons do if you forget what the icons mean. Icon Technology have also implemented OLE in this version, although it is not guaranteed to be perfect in this version. That allows the editing of, say drawfiles, simply by clicking on the frame in the TechWriter document – this is most useful.

The other new facility is that you can now save your document directly as a PostScript file, although in this form it can't, of course, be loaded back into TechWriter.

Future facilities – my wish list

My main wish is for the facility to output files in TEX format. This can happen if Icon Technology can be persuaded that it is needed. So come on all you people out there, either write to Icon Technology or let me know. My other wish, which would make TechWriter really compatible with the big outside world, is the facility for both import and export of text in RTF (Rich Text Format). This would enable the movement of documents from one platform to another. A

Keyboard Options

Brian Cowan

The lifetime of a computer is usually determined by its mechanical parts – except for the obsolescence factor. There is no long-term hope for a dead hard disc but the adept might well attempt to breathe new life into an old keyboard. On one occasion I did 'repair' a keyboard upon which I had spilled a cup of coffee. However another time, I attempted to clean a rather grubby keyboard and I tried using some contact cleaner. Disaster! My present inclination is to leave well alone. So what options are there when a new keyboard is needed? Obviously an Acorn 'spare' can be purchased (£125 through Archive) but this is an opportunity for a change.

Ergo keyboard

Castle Technology have produced a PC-style replacement keyboard at an attractive price. It is called *Ergo* presumably because of its ergonomic design which claims to reduce the instances of Repetitive Strain Injury (RSI). The keyboard has a wide leading edge to support the wrists and the rows of keys are stepped and curved for easy finger access. At first, I missed the bumps which the Acorn keyboards have on the *F* and *J* keys to locate the fingers when touch typing but then I noticed the discrete raised bars on those keys of the Ergo keyboard.

PC origins

This keyboard is clearly a standard PC keyboard which has been modified by the addition of a small circuit board to interface to an Archimedes computer. Also a reset button has been added and a socket for the mouse. The keyboard claims a minimum design life of 30 million operations, substantially more than Acorn keyboards.

The key layout follows the conventions of a PC. That will be familiar to A4 users and it is likely that future Acorn computers will use PC keyboards, so the Ergo keyboard is a step in the right direction.

Keyboard feel

Keyboard preference is a rather personal thing. I have never objected to the Archimedes ones, even the rather 'spongey' feel of the A5000 one, but real IBM keyboards I hate. They tend to be noisy and clumsy, and one tends to bash them quite hard. My favourite is the keyboard attached to DEC VT220 computer terminals. These are strong but require minimal finger force and they also have a simulated click. However I am happy to report that, in my view, the Ergo keyboard is almost as good. It requires a slightly greater finger force and it has a real click. One plus is that the lock keys have LEDs to indicate their state.

Mouse emulation

Another clever feature is emulation of the mouse action from the keyboard. Initially, I was a little disappointed that in implementing this, Castle did not follow the convention adopted by Acorn in the A4 portable. However, it actually makes more sense to use the keys in the numeric keypad. Not only are up, down, left and right provided, but using keys *7*, *9*, *1* and *3*, you have diagonal motion as well. Then *0* gives <select>, *5* gives <menu> and the dot gives <adjust>. What is more, other keys can control the mouse speed and the step size. This is one of the best mouse emulations I have seen – comparing with the A4 and IBM's 'wobbly key' mouse.

Power-on

The power-on configuration options are supported whereby various CMOS RAM settings can be altered. Thus apart from power-on [Delete] resetting all the CMOS settings, [0] sets standard monitor, [1] sets multi-sync monitor, [2] sets high res. mono., [3] sets VGA, [4] sets super VGA and [5] sets LCD. These are useful to know if you want to reset the CMOS RAM when you can't get a picture! Castle also supply a range of foreign language keyboard modules and these, as well as the in-built keyboard country settings, can be activated at switch-on.

A3000 version

There is also a version of this keyboard available for the A3000. This requires the insertion of a small circuit board under the Econet PCB. The computer is then able to sense whether the external keyboard is connected or not, rather as in the A4 portable.

A4

I used the Ergo keyboard with my A4 and it worked

perfectly, although of course the mouse (if used) must be connected to the keyboard and not directly to the A4. I was surprised that the keyboard worked so well, since I had been led to believe that you must use a PC keyboard with the A4. However, it transpires that the A4 was designed to accept either an Archimedes or a PC external keyboard. It senses which type is connected and it acts accordingly. The problem that some people have reported with Archimedes keyboards, where the mouse can 'drop' objects while dragging them, happens because the computer's polling of the keyboard can be a bit slow. But I found no problems.

Serial Port interface

The Serial Port manufacture a PC keyboard interface which allows the connection of a keyboard of your choice. The interface alone costs in the region of £100, so can hardly be considered a bargain. The advantage of that product is that it allows for the connection of a wide range of joysticks etc. If you are a serious keyboard user, i.e. a really busy typist, then you might wish to buy a super luxury keyboard, in which case, the Serial Port adaptor is for you.

Other options

I understand that there are some other keyboard adaptor products under development from other companies. We should soon see an interface which allows a PC keyboard to be switched either to an Archimedes or to a real PC. If you *have* to have a PC then this will save some desk space. It sounds as if these adaptors will cost in the region of £50, which would make them an attractive option even without a real PC.

Conclusion

The Ergo keyboard is a very well-made product which should last a long time. I have been using one for about a month and I am very happy with it. It has a robust feel and it is a delight to use. At £99 +carriage +VAT (£128.08) for the standard model or £129 +carriage +VAT (£163.33) for the A3000 version it is good value. **A**

Brian was so positive towards these new keyboards, we have done a special deal with Castle Technology. As an introductory offer we can sell the standard version at £105 inc VAT (normal Archive price £120) and the A3000 version at £129 inc VAT (normal price £155).

Using RISC OS 3.1

Hugh Eagle

Star LC-10 printer driver

Rex Palmer has written in response to Mick Day's hint in Archive 6.12 pp56-57 about using the Star LC-10. "It is, in fact, very easy to use the 'top bit set' characters (called IBM set #2 by Star) contrary to the information given in the manual. The simplest way to achieve this (and to get all the standard characters) is to use the USA character set (switches 2-2, 2-3, 2-4 ON) and to set switch 1-7 OFF. The £ sign, for instance, is then character 156.

"The printer drivers supplied with RISC OS 3 no longer include the star LC-10. The Read_Me files suggest that the nearest one should be the Epson EX-800. This may be so for the LC10*C*, but the dear old monochrome version does not support the "escape-$" codes, so the driver is not suitable. I have written a driver for the "old" LC-10 which also matches as many of the Acorn 'top bit set' characters as is possible, for the draft printing modes." Rex's driver is included on the monthly disc.

RISC OS 3 Style Guide

The man I was talking to on the Apple stand at the BETT Show pointed towards the Acorn stand and said: "Of course, we wish we had their hardware, but their software cannot stand comparison with ours." When I asked him what he meant, he explained that Macintosh applications always worked in the same way, with consistent menu structures, keyboard shortcuts, and so on.

I don't know enough about Macs to comment on this but, interestingly, the January edition of Computer Shopper (which is not exactly a magazine noted for Acorn fanaticism) contained the following statement: "The truth is that, at the moment, no-one has succeeded in creating a good, stable and logical operating environment (except perhaps Acorn's RISC OS...)" !

Wherever the truth lies, one thing I am sure of is that the standard of *useability* of applications is vital to the success of a computer platform, and a crucial part of this is the degree of consistency in "look and feel" between different programs. Of course, complete consistency is an impossible dream. Indeed, it is not totally desirable because, unless developers occasionally branch out, the standard will fossilise. If, for instance, the suppliers of Archimedes software had stuck religiously to the RISC OS 2 standards, we would never have had 3-dimensional icons, button bars or drag and drop. A degree of change is therefore necessary, even if it leads to unfortunate situations such as we have today where the standard applications supplied in the RISC OS 3 ROMs fail by a long way to match up to the current guidelines. However, it is important that someone sets the standards, and that is exactly what Acorn is seeking to do in the RISC OS 3 Style Guide which has recently been published as an appendix to the Programmer's Reference Manual.

The stated aim of the Guide is to help developers produce applications that make the computer easy and pleasant to use (Users with varying levels of experience and different requirements should find applications easy "to learn, to re-learn and to use productively.") It describes in quite extensive detail how this should be done, covering areas like how to make it clear to users what options and actions are available (through the design of dialogue boxes, menu structures, etc), how to make messages clear and unambiguous, how to provide feedback, how to make programs co-operate and share data with others in the multitasking environment and, most importantly, how to make them behave in a consistent manner. In all these matters, the Guide deals with principles of design: it does not go into technical details or tell you how actually to implement the design – these matters are left to the PRM itself and the various programming language manuals.

What has changed?

There is much in the Guide that has not changed since RISC OS 2. The main changes are in the following areas:

– the 3D option for icons and "window components" (as in the NewLook that Acorn were distributing at Acorn World 93)

– cut and paste (like Impression) rather than the old style of cutting, copying and moving selections as used by Edit, etc.; apparently the old method, with the cursor independent of the marked block, confuses many users

– the introduction of drag and drop as a method of copying and moving (as has now been implemented in Impression Style)

– a new method of selecting fonts whereby the selection of bold or italics are separated from the choice of the font itself (thus if a selection contains some text in Trinity and some in Homerton and the "italic" attribute is selected, the text will be changed to the Italic and oblique versions of the respective fonts). *(This is how Macs have operated since day one! Ed.)*

– inclusion of a "Selection" button in standard Save boxes for the user to choose whether to save the whole file or just the selection. (The purpose of this change is partly to overcome past confusion caused by some programs having a Save option in the Selection menu whereas others had a Selection option in the Save menu!)

– choosing RGB values in 100ths rather than 256ths

– iconisation of windows on the Pinboard

– the use of high resolution sprites

– some changes in the way keystrokes work when dialogue boxes are active

Points of detail

Amongst the details, I noted the following bits of good advice which many software houses might do well to observe:

– applications should not allow document windows to be closed without the document first being saved, even if the document is still held in memory: it is too easy, otherwise, for the user to forget that the document has not been saved and to lose it by switching off the computer

– closing the window of a document that has not been saved must lead to a dialogue that offers a Save option (as well as Discard and Cancel); I wish that DeskEdit would do this!

– applications (including games) that run outside the desktop should do as much as possible on the

desktop using standard conventions, including things such as redefining keys and loading saved data, before taking over the whole screen. They should also allow the user to return to the desktop by pressing either <escape> or <f12>. Saving the state of play should be done from the desktop by dragging to a directory display in the usual way

– dialogue boxes should not have a Close icon: it is not clear to a user whether any settings chosen will be implemented if he clicks on a Close icon, so a better way of cancelling a dialogue box is via a Cancel action button

– dialogue box choices should never be implemented until OK or some other appropriately worded button has been clicked on (as the Guide points out some of the dialogues in the Configure application disobey this rule!)

– where an application offers a facility via a keyboard shortcut which is on Acorn's list of standard shortcuts, it *must* use the standard combination. An example is the use of <f3> for save, and I see that Impression Style no longer uses <ctrl-f3> and has now come into line with the standard. Where a standard action is not offered, the related key combination can be used for something else. Thus, for example, Impression does not have an Undo facility so is allowed to use <f8> for another purpose.

– an application should only grab a file type if they are not currently set (i.e. it should only define Alias$@RunType_ttt, etc. if they have not already been defined)

– applications should *never* automatically redefine sprites in the Wimp pool; this is yobbish, anti-social behaviour!

– shared resources which are not eligible for inclusion in the System application should be held, not within an individual application's directory structure, but inside a separate shared resource application directory (whose name has been registered with Acorn). This must be a good way of avoiding the proliferation of duplicated modules such as has been happening with Computer Concepts' RMStore directories.

Curiosities, quibbles and criticisms

The Guide says that release notes held in a separate file from the applications !Help file should *not* be held within the application directory. Why? Where should they be held? Is it intended that !App should be held in a directory called App alongside its ReadMe file? Surely not?

The Guide also says that an application's !Boot file should not be executed from within the !Run file. Again I would like to understand why.

There is quite a lot of sensible advice about the wording used in dialogue boxes: as well as recommending the avoidance of jargon, the Guide also advises that action buttons should contain specific active verbs like "Save", "Print" or "Proceed" instead of non-specific and more easily misunderstood words like "Yes" and "No". Unfortunately, the standard operating system call for popping up a message and asking for a Yes or No answer (the SWI call "Wimp_ReportError") only offers buttons that say "OK" or "Cancel". Since designing a box with your own words in the action buttons requires rather more effort, I fear that many programmers will, like me, continue to depart from the guidelines!

One area where I had been hoping to find a change, but was disappointed, is the way in which the filename in a Save box is treated. If the file has not yet been saved, the Guide prescribes that the writable icon in the Save box must contain the default document name (e.g. "Textfile" or "Untitled") when the Save box is opened. This means that if I type in a filename, then realise that the destination directory display is not open so I move the pointer away to open it (causing the Save box to close), when I reopen the Save box I have to type in the filename again. This irritating feature has wasted a lot of my time in the years since I first used RISC OS 2!

The biggest omission in my opinion is the complete lack of any requirement for on-line Help. There is an assumption that applications will contain "help text", which *must* be placed, along with other textual messages in a separate *Messages* file (to aid translation into different languages). However, the only other references I can find are to !Help files, which are stated to be optional! In the Windows world the on-line context-sensitive hypertext help facilities of the major applications (which are considerably aided

by Windows' standard Help facility) are tremendously helpful, and I can scarcely imagine doing without them. They are supported by data files which run sometimes to several megabytes – even in compressed form! Perhaps this is the problem for Acorn: because applications have to be usable on floppy-disc only machines, such extensive help is not thought to be a realistic proposition, even as an option. Whatever the reason, I think it is sad that so many applications (even from leading suppliers, and even programs bundled by Acorn) ignore this facility. It is especially a shame because the on-line !Help application is such a good idea and is so easy for the programmer to use.

Another curious omission is any reference in the Guide to sprite dragging. Is this, perhaps, because even the Filer does not use this facility? Whatever the reason, it seems very strange that such an obvious stylistic feature (and, what is more, one where RISC OS is in the lead) has been ignored, when great attention has been paid to things like the size and spacing of buttons in dialogue boxes!

Conclusion

There is a lot that is included in the Guide's 120-odd pages. Although it is not directly relevant to non-programmers, there is plenty to interest any user. It is written in a very readable style, is admirably thought-provoking and I would encourage anyone who can get access to it to read it.

The RISC OS Style Guide is available (and in stock) through Archive for £10 inc p&p. A

Acorn User Spring Show '94

Paul Beverley

There is a certain air of expectancy about the Spring Acorn User Show. It seems to me that quite a lot of companies are aiming to launch new products at this show – more than last year. We'll do a round-up of some of them in Archive next month but this time we'll give you the basic information about the show itself.

When, where and how much?

The Acorn User Spring Show '94 will take place at the Harrogate International Centre from 22nd to 24th April and it will be open from 10 a.m. to 5 p.m. each day. Tickets cost £5 for adults and £2.50 for under 16s. There is a family ticket (2 adults plus 2 U16s) for £13. However, if you book tickets in advance, they will be £4, £2 and £10 respectively. For advance tickets ring 0737-814713 or write to Safesell Exhibitions Ltd.

What?

There will, of course, be the usual array of stands where you can talk to, and even buy from, your friendly Acorn companies but there will also be a range of supporting events. These include a free theatre programme, competitions, 'surprise features'(!) and celebrity visits.

In the run-up to the Show, a competition is going to take place in which schools can demonstrate the effective use of IT by creating a story-book with mixed text and graphics. The winners' entries will be on display at the Show.

Who?

Acorn Computers themselves are supporting the show with a large stand and your own Norwich Computer Services (Archive magazine) will, of course, be there on stand 119! Other companies who will be taking stands include:

Acorn Computing magazine
Acorn User magazine
Archimedes World magazine
Cambridge Software House
Castle Technology
Clares Micro Supplies
Colton Software
Computer Concepts
Digital Services
Fourth Dimension
Gamesware
Ian Copestake
Icon Technology
Illusions Disk magazine
Integrex Systems
Irlam Instruments
Krisialis Software
Lindis Technology
Longman Logotron

Oak Solutions
Oregan Software
Quill Marketing
Risc Developments
Sherston Software
Silicon Village
Simtec Electronics
Spacetech
Stallion Software
The ARM Club
The Datafile
Topologika
Vertical Twist
Wyddfa Software

Next month, I'll give more details of some of the exciting new products that will be on display at Acorn User Spring Show '94. A

Education Column

Solly Ezra

I would like to begin with many thanks to those who have so far responded to my comments in Archive 7.4 p28. The consistent emotion in all the letters has been one of anger.

Janet Handcock of the Perse School in Cambridge says, "For respondents from higher education and industry to comment on the irrelevance of Acorn, when they have no in-depth knowledge of the machines or what the teachers do with them, is outrageous!"

Christopher Price of Merton Court School refers to a series of bald and unproven assertions based on scant evidence. He also agrees that there is no 'industry standard'.

Torben Steeg, University of Manchester, Department of Education, has written to endorse my views. He says, "I think the most significant issue is the one about fitness of purpose. The choice of a machine for education should be made on educational grounds. One of the criteria might relate to life after school, but even here the focus should be on the kinds of things that students might do, not on particular platforms. Apart from anything else, the frame of mind that sees the platform as important will, logically, also see the package as important and here, despite the claims of Microsoft, there is no standard even in the PC world".

Torben also informs us that, based on the information he has received, he gathers that the Hong Kong stock exchange and Rolls Royce use Archimedes computers. I agree with him that we should gather some more examples on the use of Archimedes and Macintoshes in an attempt to break the myth of the 'standard' and allow the focus of decision-making to return to educational issues.

Whose side are you on?

I am taking sides in this issue – I am on the side of the pupils. It matters not whether the pupil is using a computer of a particular brand or is using a particular 'platform'. What is vitally important is the software available for use on that computer. The humble BBC computer with its limited RAM did serve the pupil in school wonderfully well. The software that was originally available for it was innovative and set the trends. Initially, there was a plethora of games but soon there came some admirable software that was educational in the very best sense of the term. Further, the BBC computer was very easily adapted to control various bits of apparatus in the science laboratory and then in other areas of education.

Since those days, we have come a very long way. The National Curriculum recognised the place of IT (information Technology) in the total education of the child and thus made provision for it.

I quote from the National Curriculum:

Pupils should be able to use IT to:

Communicate and handle information.

Design, develop, explore and evaluate models of real or imaginary situations.

Measure and control physical variables and movement.

They should be able to make informed judgements about the application and importance of IT, and its effect on the quality of life.

The tools and resources we choose must therefore help us achieve those aims. It is not the purpose of

education to give pupils specific training in the use of particular machines, tools or gadgets – that is the purpose of vocational institutions, training colleges and apprenticeships. Our aim as educators is to develop, both specific and broad, that are transferable. To equip the child with abilities to think logically and clearly, to be able to analyse, deduce and arrive at balanced conclusions.

Educational Computing and Technology

Lisa Hughes, in the January issue of ECT, has written what I consider to be a very balanced article in which she examines the issues raised in the debate of the so-called 'industry standards'. While Lisa seems to be sitting on the fence with respect to platforms, she is very clearly on the side of the pupils and teachers. She draws a distinction between training and education and goes on to emphasize the fact that its the software that counts.

If you are in education, you should also subscribe to ECT since it is a magazine that has very clearly stated educational aims.

I would also recommend to you pages 284 to 289 of the January issue of Personal Computer World.

Please do take the trouble to write to me at 35, Edgefield Avenue, Barking, Essex IG11 9JL. A

OakLogic

Bevis Peters

Oak Logic is a multitasking program for designing and simulating digital logic circuits. It comes on one 800Kb disc, along with a few examples and a large number of pre-made microchip circuits, (as will be explained later), and a 36-page stapled A5 manual.

Installation to floppy or hard disc is very simple, although it does not come with a copy of !Sysmerge for updating the !System folder, which would have been handy.

The program

The software loads onto the iconbar by double-clicking, and takes up about 256Kb of memory.

Clicking on the icon with <select> brings up two windows; the main display and a separate unattached tools window. This tools window contains icons for all the basic gates and a lamp, astable (oscillator), input pad, output pad and simulation switch. Circuits are made up by placing these symbols, or any other pre-made chips, onto the main window by dragging and dropping them. These symbols are forced onto a grid layout.

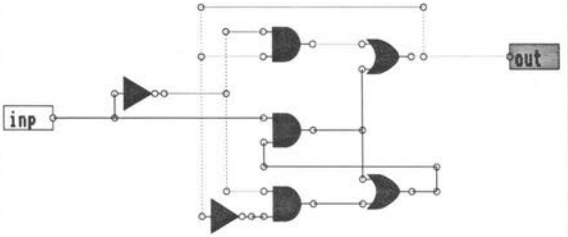
The manual starts with an example circuit; a traffic light simulator. The construction of this is described step by step in a simple and easy-to-understand manner, although with my knowledge of digital electronics, I found myself skipping over bits. I found that the example circuit worked just as they said it would, first time, with no problems.

The rest of the manual describes the various program options in more detail, although the program is very simple to use and could probably be tried without the manual at all – always a good test of software friendliness.

In use

The program allows all the base components to be placed easily on the board with its very handy dragging, although the dragging can be quite slow with complicated boards and the components can only be placed in a left to right orientation. Although this may be good practice, some circuits look neater if you can make components point towards each other – a mirror option would have been nice.

Wires are drawn with a straightforward Draw-like method, although again this is slow. Having pushed <select> to mark the start of a wire, there is a noticeable pause before it appears on the screen and if you move the mouse before it has appeared, it does not get drawn at all. Moving a single node or connection point on a wire moves all the wires joined to that point as well, thus keeping the circuit intact. Also, deleting a component deletes any wires which would have been left hanging off it – this may neaten the layout, but if you want to replace a component with another one, you have to redraw all the wires again. A neat point is that the mouse pointer changes when it is over a node or wire to help with the wiring.



A simple flip-flop circuit

Moving components about also keeps the wiring intact and is done 'realtime', i.e. you can see the component and the wires as you drag them.

Input and output pins can be placed easily, and the text in them changed, albeit only up to four characters long.

A circuit can be designed and then saved as a sub-circuit to be used in later designs. For instance, I built a full adder and saved it and then dragged it back into another circuit where it appeared as a box with labelled inputs and outputs.

An astable is available whose rate can be changed, though not its duty cycle. However, its maximum oscillation rate is set by the speed at which the program can simulate the circuit.

When the simulation switch is thrown, the program continuously works out the logic of the circuit, changing the astable's state and redrawing wires with a high logic value in orange. Inputs can be toggled between high and low states by clicking on them with the mouse. What is particularly impressive is that the circuit can still be edited while the simulation is running.

The completed circuit can be saved as an OakLogic circuit or a drawfile, and can either be printed through a RISC OS printer driver or sent to a plotter. Two separate programs, DrawPrint and DrawPlot are used for this. They allow for accurate printing and positioning on the paper, but for OakLogic, to work, they were really necessary – and one of them must be running to print at all. The results from my BJ10e were much the same as just printing the equivalent draw file.

Problems

By far the biggest problem with the program is that the window redraw is very slow, and often goes very wrong with complicated circuits.

To test the program, I recreated a slightly simplified circuit that I designed for my degree which used parallel processing to run the Game of Life algorithm. This was originally built up on a very powerful and complicated DEC station and involved some very complicated simulations.

One processor in the circuit contained 72 gates and was built up from many sub-circuits.

The program allowed me to build it very quickly and easily, and the subsections could be simulated quite successfully. Trying to simulate the whole circuit was almost beyond the program's ability, however. The screen redraw failed completely. To see what was happening, I had to continually force the program to redraw the window by pressing <f12> and <return> or by dragging other windows across it. It was also very slow, although that was not altogether surprising.

Conclusion

This is a good program but not quite versatile or powerful enough for particularly complicated circuit designs. Any serious circuit simulations cannot be practically performed. A system whereby a text file of the inputs can be written and fed into the software which then produces a text file of the outputs would be more useful for complex circuits.

For more simple designs and as a teaching aid, OakLogic is very good. It is very simple to use and with the wires lighting up as the circuit runs, it is very easy to see mistakes and to see how the logic is working, and I'd certainly recommend it for schools teaching basic digital logic.

OakLogic has recently been reduced in price. It is now £70 +VAT from Oak Solutions or £77 through Archive. A

PipeLineZ

Gerald Fitton

I have been asked to write a further article about Charts in PipeDream and to include instructions which will enable you to draw charts using non-consecutive rows of data. Your wish is my command! However, first a few words about Fireworkz.

Fireworkz

There are still quite a few bugs in Fireworkz version 1.07. Some of these are a bit 'nasty' in that you get the wrong answer but no error message and nothing obviously wrong. The most worrying of these seems to be associated with the set_value(,) function. If you use set_value(,), make sure that your spreadsheet also includes an if(,,) function to check if the spreadsheet is making a mistake. For example, if you have a rectangular block of numbers, you can add the rows, add the columns and then, using the if function, check that the sum of the added rows equals the sum of the added columns. I recollect writing an article in Archive about using if(,,) for checking a spreadsheet when PipeDream 4 was causing a similar amount of consternation.

I must say that I'm surprised that version 1.08 hasn't appeared yet but I'm assured that it will soon. Make sure that your purchase is registered and keep asking about your free upgrade!

Using the files on the monthly disc

Now to the Charts tutorial... Suitable files will be found on the monthly disc together with a [ReadMe] file of the tutorial. If you use the Archive disc then, apart from the [ReadMe] file, do not attempt to load and run any of the other files in the PipeLineZ directory from the master disc! This is because Colton Software's hot linked graphics operates by saving copies of chart files back to disc. The original file I have included will be over written. For that reason I strongly suggest that you work with back up copies of the files rather than the originals.

Outline fonts

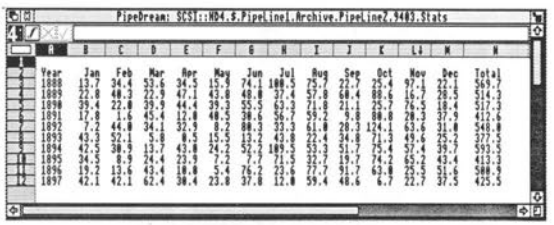
To use the PipeDream Charts facility, you will also need outline fonts. In particular the Homerton (and maybe the Trinity) fonts must be loaded (if in doubt, click on the !Fonts application) before you load PipeDream to the iconbar. PipeDream cannot add fonts to its 'private' font list after it (i.e. PipeDream) has been loaded to the iconbar.

If you send me a Charts application for inclusion in PipeLine, please use only Homerton and Trinity .

General

In this tutorial, I am going to explain how you can draw multiple bar charts using data which is not in consecutive rows. Although I shall concentrate on bar charts, the principles can be used to draw multiple line graphs using data which is not in consecutive rows.

Before I start, let me acknowledge that the inspiration for this article was a problem sent to me by Peter Paddisson. It is his [Stats] file which I am using as the data for this tutorial. I believe that the file is the monthly rainfall somewhere in the UK, measured in inches and the original data he sent me runs from 1888 to about 1990.



	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1														
2	Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
3	1888	13.7	34.4	53.6	34.5	15.9	74.1	100.5	75.7	22.7	25.4	97.1	22.1	569.7
4	1889	22.8	48.3	22.9	47.1	43.8	48.8	37.4	57.8	68.4	88.6	16.7	20.5	514.3
5	1890	39.4	22.8	39.9	44.4	39.3	55.5	63.3	71.8	21.1	25.7	76.5	18.4	517.3
6	1891	17.8	1.6	45.4	17.8	48.5	38.6	56.7	59.2	9.8	80.8	28.3	37.9	412.6
7	1892	7.7	44.8	34.1	37.9	8.2	88.3	33.3	61.8	28.3	124.1	63.6	21.8	540.8
8	1893	43.3	52.1	5.8	8.5	15.5	13.2	43.8	22.4	34.8	71.3	49.6	25.2	377.5
9	1894	42.5	30.9	13.7	43.8	24.2	52.2	109.5	53.3	51.7	75.4	57.4	39.7	593.5
10	1895	34.5	8.9	24.4	23.9	7.2	7.7	71.5	32.7	19.7	74.2	65.2	43.4	413.3
11	1896	19.2	12.6	43.4	18.8	5.4	76.2	72.6	77.7	91.7	62.8	25.5	51.6	506.5
12	1897	42.1	42.1	62.4	38.4	23.8	37.8	12.8	59.4	48.6	6.7	22.7	37.5	425.5

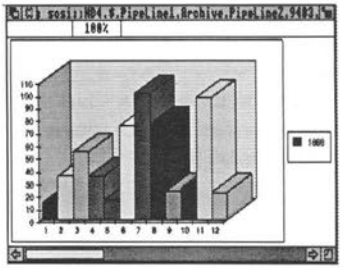
The statistics

If you have the monthly disc, double click on [Stats]. If you don't have the monthly disc, the picture above shows the file.

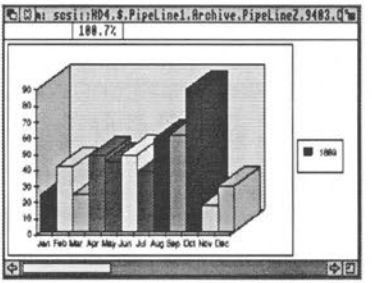
You will see that the month names are in row 2, the year names are in column A (note that these year names are not numbers but text strings) and the data is in the block B3M12. Peter has calculated an average in column N.

The easiest chart

Mark the block A2M3 and then execute <ctrl-CHN> (CHart New). You will find yourself with a chart which looks much like [Chart1888], (shown overleaf – the only difference being that in the chart you have just produced, all the bars are red whereas,



in [Chart1888], the colours of the bars cycle through a set of nine colours. You can 'convert' your chart to one of many colours by executing the following sequence. Click <menu> on the chart (not on the data) and a menu called Chart will pop-up. Run the pointer through Gallery and click on Bar. In the version of PipeDream which I have (V 4.13), there are seven types of bar chart presented, a top row of three and a bottom row of four. Click on the third from the left (the right most) of the bar chart types in the top row and your bar chart will turn into one having nine differently coloured bars.



Separated rows

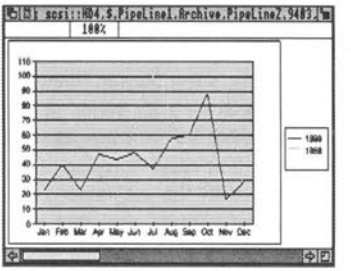
Now how do you draw a bar chart for the 1889 data without including one for the 1888 data?

Mark the block [Stats]B2M2 which contains Jan to Dec. Be careful; make sure that you do not include either A2 or N2. I find the easiest way of marking the block B2M2 to click <select> in B2 and click <adjust> in M2.

Execute <ctrl-CHN> to create a new chart. You will see a pop-up message box which reminds you that there is no numeric data in the marked block. Although there is no numeric data, you must choose to continue by clicking on the Yes box.

Place the pointer in the new chart and click <menu>. Select Gallery – Bar and then select the third type of bar chart from the first row of bar charts. That is the one which gives the multi-colour bars. Finally, click on the OK box.

Mark the block [Stats]A5M5 (note that the year is included in the slot A5) and then execute <ctrl-CHA> (CHart Add) to add the data to the (blank) chart. You will observe that the legend (contained as text in slot A5) shows in the chart as year 1890.



Two sets of data on one chart

You can add a second set of data to a bar chart but, personally, I don't really like the result. I prefer the multiple line graph of [1888_1889] above. The method of creating a line graph with multiple lines, adding as many as you like, is fairly straightforward.

Mark the block B2M2 and execute <ctrl-CHN>. Click on Yes to proceed even though there is no numeric data in the marked block. When the box containing the Chart appears click <menu> – Bar – Line. Turn off the 3D button, ensure that the first type of line chart has been selected (the one at the top left) and click on OK.

Now you can mark any row such as the 1889 results in A4M4 and execute <ctrl-CHA> to draw the line graph for that year's data.

If you mark a block such as A6M9 to include three year's data then you will draw three lines at once (all in different colours)!

In conclusion

If you do have any problems with creating the Chart you want, then, like Peter, please send me a disc file of typical data and an indication of the many things you've tried that didn't work. It does save me considerable time and allows me to send you back a reply which uses your data and a chart in the format you want. A

Genesis/Magpie Column

Paul Hooper

Optima Resources

In my review of Optima (Archive 6.9 p58) I mentioned the resource packs that would accompany this package. These packs are complete in themselves and you do not require Optima to run them but access to Optima will enable you to alter them. The packages are 'Hairy Maclary', 'Scattercat', 'Our World in Space' and 'Words and Pictures' and I have now had a chance to run all four of them with three different groups of children. All the packs come with the minimum packaging of a plastic bag and an A5 pamphlet manual and most packs come with two copies of the program, one on a single HD disc for the newer machines and also on two 800Kb discs for the rest.

Hairy Maclary and Scattercat

Both of these are based on the excellent books by Lynley Dodd and the pack includes the relevant hardback book. Each Optima page includes a scanned picture from the book and the text from the facing book page. Each sentence is a sound sample and can be activated by clicking on the sentence. The voice is a little soft in a noisy classroom but could be replaced by another if you have Optima.

Using the programs with reception and year 1 pupils (5 – 6 year olds) in pairs, it was interesting to watch how they used them. Most decided to read the book and then have their reading confirmed by clicking on the sentences. Difficult words were clicked on to hear the word and many were disappointed that they got the whole sentence. Yet the fascination of the computer speaking the story kept them enthralled. I also took this to my local playgroup with pre-readers. They adopted a completely different strategy, following the pages on the screen along with the book and letting the computer do the reading.

Both packs are available from NW SEMERC priced at £18 including the hard copy of the book and represent excellent value for money. (Add £3 p&p +VAT to those prices.)

Our World in Space

This is an update of the space program on the Optima examples disc, but it has grown to 1100Kb. It now includes not only 'Our Solar System' but also man in space, the stars, the discovery of space and a quiz. The layout and graphics are excellent and the presentation of information is stimulating and encourages you to explore more. Sound samples are used sparingly but to good effect, with the famous "The Eagle has landed" phrase, along with some demonstrations of the Doppler effect.

The group of eight and nine year olds that tried it had to be prised loose from the computer and then went on to explore the topic in books. Again, it is good value for money at £15 with plenty of space left on the disc to expand the program. (Add £3 p&p +VAT from NW SEMERC.)

Words and Pictures

This program is about basic word recognition. The first part presents you with a picture and the written word along with a sound sample. Having worked through the word list, you are then presented with three pictures, a written word and the sound sample and you have to select the correct picture. The basic idea sounds quite good but the implementation leaves a lot to be desired. The word list seems to have been selected on a fairly arbitrary basis to match the pictures available. The sound samples are occasionally unclear, and are played before the page is opened, so that you get the sound 'ball' when on screen is a picture of an apple! Then the page with the ball picture opens.

If you are trying to encourage written word recognition, it seems rather pointless to play the sample of the word and present the child with a choice of three pictures. All that happens is the child listens to the word and then selects the correct picture without looking at the written word. Although this is again reasonably priced at £15, it would be a lot easier to make up your own application based around your own reading scheme. (Add £3 p&p +VAT.)

The future of Genesis

Having just returned from a hectic day at BETT, I thought I would try and set out what is happening to Genesis. Genesis Plus is to be replaced by Genesis

Project, Genesis 2 will become Genesis Professional and new version of Genesis for the Apple Macintosh will join the PC version. There is also to be a top-end version called Genesis SDK which will include cross-platform capability to produce applications on all three machines.

So far as I can gather, the availability schedule is:

Genesis Project:	Mid March
Genesis Professional:	Mid March
Genesis SDK:	Summer
Genesis for Windows:	Out Now
Genesis for Mac:	Summer

I had an opportunity to play with Professional, and noted that the user interface had been improved and you now have the ability to define master pages and also frame styles. Text can be in any colour on 3D buttons and frames. Re-ordering of frames on a page has been made easier but perhaps the biggest enhancement is the turbo-loading system which will enhance the speed of page loading. More data types can be imported into Genesis – Artworks is now supported along with Replay and even BMP files from the PC. There will be upgrade paths for existing users with a charge of about £60 to upgrade from Genesis 2 to Professional.

Professional does certainly bring Genesis up-to-date with a much friendlier feel and as soon as I can get hold of a copy, I will do a review.

(If anyone wants a copy of Genesis Professional (£120 +VAT = £141) at a reduced cost, we have some copies of Genesis II on special offer at £55 which can be upgraded to Professional for £60 +VAT = £70.50. So by buying one of these now, you save £15.50 overall, pay out only £55 initially, have a copy of Genesis II to work on and are able to pay the rest from next year's budget! We only have five copies left, so please ring the Archive office if you want to book one of them. Ed.)

The future of Magpie

Magpie already includes the ability to use Replay but from what I gathered around the Longman stand, I think there will be a new version of Magpie released sometime around the middle of the year. I don't have any details but I don't think it is too late to influence the upgrade. So if there is anything you would like to see Longman incorporate, you should write to them straight away.

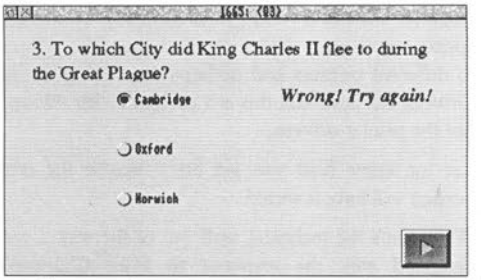
Hints and tips

One of the problems with third party hardware is that it doesn't always conform to a set standard. HCCS's Vision digitiser produces excellent results that can be imported straight into Genesis but if you try to load the same sprite into Magpie, the colours are wrong. The problem is that HCCS use a non-standard palette to achieve the results. To overcome this, load the sprite into Paint and go to the Edit option. If you open the submenu, you will see that the palette option is ticked. Click on this to remove the tick and then save the resulting sprite straight into Magpie. The colours won't be completely correct but they will be a lot nearer than before.

Both Magpie and Genesis can be made reactive to user input and the use of these features can make an application more rewarding. In one of the applications I have written, I required the user to click on a box and then be rewarded the user in some way. On a Magpie page, you set up the box was set up and, over the top, create a text frame with 'Well Done!' in it. Then change to the button tool and click on the text frame and select 'Hide and reveal on Mouse click.' Save the page and then, when you click on the box, the reward will pop up. The Magpie application on this month's disc is taken from WIMP Tutor and demonstrates this well.

With the added flexibility of Genesis, much more is possible, including a fully interactive quiz. GenLib contains a button called 'Radio3' which, when dropped onto a page, provides three radio type icons which have a word frame associated with them. Write your question at the top of the page and alter the word frames to three alternative answers. Next create a frame after the answers, indicating which answer is correct as in the picture below. Save your page and then call up the script file and alter the three Correct/Wrong frames so that they are called Right, Mis1 and Mis2 instead of the date. Also, alter FGCOL to the same colour as your background. In this example, it will be FGCOL 1. Now add the following five lines to the three frames labelled Button 1-3 just before the END FRAME command:

```
ON SELECT BEGIN
SET FGCOL OF "Right" TO 11
SET FGCOL OF "Mis1" TO 1
SET FGCOL OF "Mis2" TO 1
END
```



In this case, the answer is correct and the frame Right has the text turned from FGCOL 1 (grey) to FGCOL 11 (red). You will need to alter the values of FGCOL for the other two frames. An example of a Genesis interactive quiz is on this month's disc.

A challenge for Genesis

Following on from the above, I would like to see if anyone can solve a problem that it took me a few months to crack. Taking the above quiz page, can you place a box on each of the pages that keeps a running total of the score that you have got in the quiz? A score box on one page is easy, but how do you keep the variable from page to page? I suppose I should offer some sort of prize, but as a poor hard up student... *(Would half a dozen Archive mugs be any good as an incentive? Ed.)*

The Swap Shop

We have added another three applications to the Swap Shop, all historical. One is on the Black Death of 1340s, one on the Great Fire of London and one on the Plague of 1665. These are complete applications with many good graphics and sound effects. All are Genesis format at the moment but will be converted to Magpie fairly soon. If you require a copy of the latest catalogue just send me a blank disc along with the return postage. By the time you read this, I hope to have sent out a copy of the new catalogue to all the people who have sent me applications in the past year.

The End Bit

If you have any queries or questions about either program or if you just want to send me examples of your applications then send them to: Paul Hooper, 11 Rochford Road, Martham, Great Yarmouth, Norfolk, NR29 4RL. (0493-748474) A

ArtWorks Column

Trevor Sutton

I am pleased to say that, as was hoped, this column is written using Impression Style and I am finding it to be a pleasant improvement on previous Impressions. As an ArtWorker, I suppose it was inevitable that I should like the tool bar. However, I must avoid the temptation to write a review, perhaps just mentioning Style's relationship with AW.

Style & ArtWorks

As with the later versions of Impression, Style accepts AW files and the familiar WYSIWYG knob appears as an icon, allowing access to a menu offering different qualities of displayed image. I am not feeling the benefit of this at the moment as my old AKF18 has broken and I am using an AKF17 which becomes unbearable after a while. I don't care what people say about the AKF18, I want mine back!

What is interesting – and perhaps news to some people – is that drawfiles can be anti-aliased from Style. TIFF images can also be loaded.

Perhaps the most useful feature is the facility known as OLE – Object Linking & Embedding. What this means for an AW drawing is that holding down <ctrl> and double-clicking on the drawing in a Style document will load it into AW. It can then be saved back into the frame by clicking on OK in the save window of AW.

One thing which needs examination is the quality of printout from any AW files which include sprites. As described below, there seems to be a problem with the current version of AW as Steve Ellacott describes and I have subsequently tested.

Sprites, printing and AW

The reproduction of small sprites on a 300dpi laser printer (using HP Laserjet emulation, although my printer is actually a Brother) is very poor when printed from AW 1.12 with the default settings. Our church logo contains a fairly detailed monochrome sprite which is scaled to a small size. Although one cannot expect very good reproduction at 300dpi, all

other applications (including Impression) produce reasonable results. However, the output from AW is disastrous. The problem appears to be that the mapping to the target printer resolution (from the separations submenu on the Print dialogue box) is hopelessly conservative. My experiments so far indicate that the best results can be obtained by setting this to be 3 to 4 times the actual resolution *but not an exact multiple.* If it is an exact multiple, or if it is too high, lines appear on the image. 1000 seems to be a good starting point for a 300 dpi printer. However, the best choice is probably dependent on the actual sprite and the scaling involved, so experimentation is likely to be required. I enclose some printouts of my experiments.

While experimenting with this I also uncovered another bug. If the AW window does not have the input focus (e.g. if you have just finished a print), but you try to change the "Print This Ink" icon, an unrecoverable error occurs.

Thanks Steve. This is another of the irritating little problems which committed bug hunters have found.

The problem of printing sprites from AW is altogether more serious and I have experimented after getting similarly poor results.

The problem is, I feel, that the aspect ratio of a sprite cannot be maintained in vector graphic programs like Draw and AW without using the magnify option in Draw or the Scale option in AW. This becomes very fiddly when you want the sprite to fit into a particular space. In Impression, you would simply make a frame and fit to that frame retaining the aspect ratio.

I tried several prints to a Canon BJ-10SX and the results from Impression were far better than those from AW which showed white horizontal and vertical lines when the sprite was reduced in size. (I remember when Ovation did this !)

The very worst results were achieved (if achievement it be) when the sprite was loaded into Draw and subsequently saved as a drawfile. This is a recommendation from certain software applications.

Well, I suppose I should send this information to CC, but one would hope that they just might read the column. Instead, I make a plea for some research. Please, try out prints from AW containing sprites, some resized and saved as drawfiles printed to different printers and perhaps even using Turbo Drivers. I believe that this is a problem with AW and not the printer drivers.

Let me know how you get on – maybe the next version will have it sorted.

Well, that's the technical stuff out of the way. I was delighted with the response to Mike Charlton's contribution on tessellation. His love of the isometric grid and his desperation with AW prompted the following response from Richard Lyszkowski...

Isometric grid for AW

I was most interested to read your article in Archive 7.2 p23, regarding the absence of an isometric grid facility in AW. I too found that absence frustrating but got round it, to some extent, by creating an isometric grid of my own and placing it in a background layer. Isometric drawings could then be created using the grid as a guide. The main problem was the slowness of redrawing the grid and the continual need to go to 4000% enlargement to ensure accuracy. I have sent in a copy of my AW grid which could go on the Archive monthly disc.

Your article, however, prompted further thought on the matter. My problem was: how can I retain the grid lock **and** obtain an isometric grid too?

This simple example shows how it can be done:

1) Open an AW window and view and lock the grid.

2) Draw a square with edges parallel to the edges of the AW window.

3) Draw its top-left to bottom-right diagonal.

4) Group the square and diagonal.

5) Choose the **Rotate tool** and rotate the square through 45° about its centre.

6) Choose the **Scale tool** and change the aspect ratio to 57.735%. (The 'exact' % value would be given by 100 divided by the square root of 3.)

7) Scale the object by 1.224744871. (The 'exact' value is the square root of 1.5) The effect of this scaling is to make the isometric grid spacing the same that of the original square grid.

8) Further rotations through 60°, 90° or –30° may be desirable, depending on how your original was created.

I have included some simple examples in a drawfile (on the monthly disc) to show the results of some of my experiments (with Draw). Interestingly, the Draw version of the isometric grid, appears to be more accurate than the AW version, despite the acceptance of more significant figures by the latter application! No doubt someone can explain. (Has some accuracy been sacrificed in the quest for speed?)

The process is also easier to carry out in Draw, though obviously unnecessary in that application.

I have included a couple of fairly boring doodles which I made with the assistance of the grid. As you will doubtless notice, the AW files were the results of my efforts in October, 1992 – I've progressed somewhat since then, but confess to still finding Draw much easier to use than AW.

Some final thoughts relating to the square-to-isometric transformation. It means that M.C.Escher drawings will now be possible... provided, that is, you think that my suggestion should be passed on! And yes, it would be better if AW already had an isometric grid facility. Wouldn't it be good to be able to generate *any* regular grid system, to which a grid lock could be applied? Imagine all the tessellations which would then be possible!

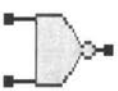
Thanks Richard. I welcome these mathematical applications of AW. I am a bit of a chaos man myself and I've just found a way of converting recursive, basic procedures into drawfiles. Drop these into AW, colour them in and send them to the Royal Academy! Richard's files are available on the Archive monthly disc.

Coda

Mike has promised me some Celtic Knot Artworking and I promise an interesting article soon from a friend who has used AW in drawing from life. A glass of water on the computer bench, sketched by mouse and subsequently manipulated. Now that's art! A

$\frac{d}{dt}$

ArcSimp III



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DTP Column

Richard Hallas

This month's DTP Column takes the form of a detailed look at Computer Concepts' WordWorks package and a shorter comparison with Risc Developments' Desktop Thesaurus.

WordWorks

WordWorks is a new multi-purpose hypertext system from Computer Concepts. Its main use is as a dictionary and thesaurus package but, in fact, it has a much wider scope than just these two applications. Its launch has been rather overshadowed by the fact that it is bundled free with Impression Style (and Publisher, when it appears). However, it is available separately as a stand-alone product, and in this review, I want to look at it on its own merits and in comparison with Risc Developments' Desktop Thesaurus, which itself has recently undergone a fairly major upgrade.

The package

When you buy it as a separate package, you get WordWorks in a very attractive cardboard box presented in just the same style as a Collins dictionary – even down to the name 'Collins' emblazoned on the lid. The implication is, therefore, that it is just a dictionary and thesaurus, as stated on the box. However, it has the potential to be a lot more than this, and even now it acts as a very comprehensive help system for Impression Style and, indeed, itself.

The box contains four discs, a registration card and an eight-page manual which is very nicely presented but hardly necessary, as the software is both easy to use and self-documenting. Use as a help system is a primary purpose of WordWorks: Impression Style and WordWorks both have a 'Help' item at the bottom of their main menus, leading to various choices. The help file supplied with WordWorks contains full instructions on its use, along with electronic copies of the printed text in the real Collins Gem Dictionary and Thesaurus. In fact, it's all very much more detailed than the printed manual.

The installation process is simple: just insert a disc, double-click on !Install, and follow the instructions – very straightforward and friendly. Although you can designate the location of WordWorks, the bulk of the application is actually stored in the !System directory: the WordWorks application is actually just a front to the more general HyperView application (which is what you see if you look deep inside !System). I found this approach a little confusing, but also, the version of the program I received for review, version 1.04, adds an 'information *i*' icon to the iconbar rather than the WordWorks dictionary icon shown in the filer window and in the manual – but that's only a small point.

In use

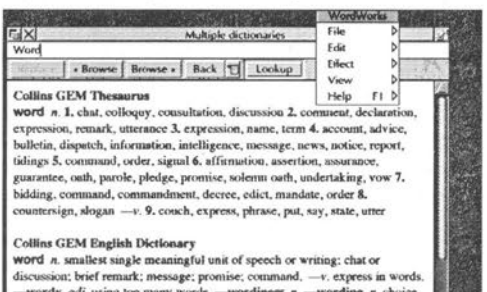
Once this initial confusion has passed, WordWorks is a doddle to use. If you're using it from Impression, then to load it you have to do no more than choose 'Thesaurus' from the spelling menu, or choose one of the help options. Otherwise, double-click on the icon as normal. A window opens showing the hypertext files currently in use: this will normally be the Collins GEM Thesaurus and Dictionary, but if you have chosen a help option, it will be the appropriate page of a help file instead.

The top of the window contains an area into which you can type a word or phrase. WordWorks will intelligently try to remove the ending from the word or phrase and attempt to look up the root word. If it can't find a root word, WordWorks will use 'inverted dictionaries' to find out if the word occurs in the dictionary or thesaurus, and will present a list of records in which the word appears. If you are using Impression, simply highlighting a word or phrase in your text will send it to WordWorks automatically. Actually, I personally find this a bit of a nuisance: as soon as you make any kind of selection in Impression, it's immediately transferred to WordWorks (if its window is open). It's possible to turn this feature off but then you have to type in the words by hand. I'd like the ability to send a word to WordWorks simply by pressing a hot key – but again, it's a fairly minor point.

Once a find is displayed in the WordWorks window, it is possible to highlight a word and then double-click on it with <select> to look it up in WordWorks,

or double-click on it with <adjust> to transfer it to whatever application has input focus. (The Replace button has the same effect.) If that happens to be Impression, everything happens instantly and intelligently, with any selected region being replaced by the word(s) appropriately capitalised. With other applications, the solution is a little less satisfactory: WordWorks effectively types out the text for you, and you can see it appearing character by character at the caret. A direct transfer would have been better but, presumably, this must not have been possible.

A related irritation is that WordWorks will not accept a text file dragged to it as input. For programs such as Edit or Ovation which do not communicate with it directly, it would be nice to be able to highlight a word and save it as a selection into WordWorks. However, if you try this, WordWorks simply ignores the file, and you have to type in your word or phrase manually.


WordWorks
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Direct
View
Help F1
Multiple dictionaries
Word
« Browse
Browse »
Back
Lookup
Collins GEM Thesaurus
word n. 1. chat, colloquy, consultation, discussion 2. comment, declaration, expression, remark, utterance 3. expression, name, term 4. account, advice, bulletin, dispatch, information, intelligence, message, news, notice, report, tidings 5. command, order, signal 6. affirmation, assertion, assurance, guarantee, oath, parole, pledge, promise, solemn oath, undertaking, vow 7. bidding, command, commandment, decree, edict, mandate, order 8. countersign, slogan —v. 9. couch, express, phrase, put, say, state, utter
Collins GEM English Dictionary
word n. smallest single meaningful unit of speech or writing; chat or discussion; brief remark; message; promise; command. —v. express in words. —wordy adj. using too many words. —wordiness n. —wording n. choice and arrangement of words. —word processor keyboard, microprocessor, and VDU for electronic organization and storage of text. —word processing n.
DTP 1
Work
Rich
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Apps
Fonts

Presentation

The above niggles are slightly annoying if you are trying to use WordWorks with any program other than Impression but, in all other respects, WordWorks operates very quickly and intuitively, and it searches through its multiple dictionaries with commendable speed. The presentation of the main window is very good, and looks just like a printed dictionary. Multiple outline fonts are used just as in the printed Collins counterparts, and it is possible to set the heading and body fonts which WordWorks uses, along with the font size.

It is possible to resize the windows up to full screen size, and the text will reformat itself to fit. You can have multiple views open at once, and saving your choices will record the position and size of the windows. You can even save out entire entries along with their styles, in the format used by Impression.

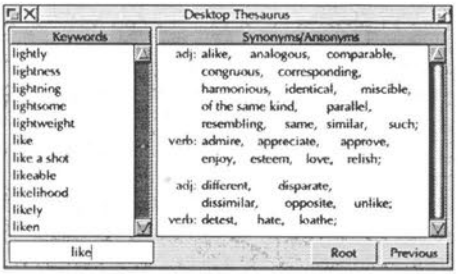
Although the Collins dictionaries themselves do not make use of 'hotlinks' (you can click on any word in the window and WordWorks will try to look it up) the help files all do. Hotlinks take the form of coloured text which, when double-clicked, will take you to the relevant page. Again this is extremely fast and easy to use, and the 'Back' button at the top of the window makes it very easy to return to the page from which you came. (There is also a History menu, which lists the last 32 entries you viewed, and browse buttons which let you move backwards and forwards through the file a page at a time.)

To summarise, then, it is important to remember that WordWorks is not just a dictionary and thesaurus, but a full-blown hypertext system with hotlinks. As such, it is extremely powerful – more so than it first appears. For instance, the entry on WordWorks' hyper dictionaries in the Glossary informs us that the files may contain not only text with hotlinks but also graphics, sound and movie clips. In fact, the program is not yet capable of incorporating these, but it will be at some future stage. This has very important implications – it potentially makes WordWorks the ideal retrieval system for CD-ROM, and the potential is obviously there for some very exciting applications indeed. (I'd dearly like to see the PRM in WordWorks format, for example.) *(And what about the NIV Bible? Ed.)*

Considering that every owner of the new versions of Impression (and in practice that should mean virtually every Impression user) will get a free copy of WordWorks, and the fact that WordWorks retails separately, it seems likely that WordWorks will become a standard information retrieval system on RISC OS. It is to be hoped that other manufacturers will support it, as I think it is potentially the best such system I have seen, although without reference to a version which can incorporate graphics and sound, it is difficult to make the conclusion for certain at this stage.

Incidentally, Computer Concepts is looking at the possibility of doing foreign-language versions of the WordWorks dictionaries which could be of interest

to many users. WordWorks is excellent value if bought alone, but considering it is free with the Impression upgrade (which is cheaper), there is little excuse not to get a copy. I sincerely hope that applications from publishers other than Computer Concepts will make use of its facilities in future.



Desktop Thesaurus

Version 1.23 of the Desktop Thesaurus has just appeared, and I thought it would be useful to have a look at it alongside WordWorks to see how they compare. This product is, of course, a dedicated thesaurus, and a much simpler program overall than WordWorks. It has been reviewed before in various magazines, but to present a brief resumé, a single window contains a word list on the left and a list of 'finds' on the right, with an area at the bottom for you to enter words.

The major new addition to version 1.23 is that it now shows antonyms as well as synonyms. The program contains 17½ thousand keywords and nearly 200,000 synonyms and antonyms. In the finds portion of the window, the synonyms are listed with blue labels next to them stating whether they are nouns, verbs, etc., and now the same window also shows the antonyms listed after the synonyms, and with red rather than blue labels.

In use, the thesaurus is very straightforward: it is directly supported by several applications, namely Ovation, EasiWriter, TechWriter and Wordz. Pressing a hot key in any of these applications will call up the thesaurus for the word at the caret, or you can simply type in a word as normal. Happily, unlike WordWorks, it is possible to save a selected word from a text editor into the thesaurus so you don't have to type it again. Transferring text back into an application, though, works just like WordWorks: the thesaurus types it for you at the caret. The fact that both programs use this method rather implies that a more direct transfer method is not possible.

Apart from the addition of antonyms, the Desktop Thesaurus works just as before. Clicking on a word in the finds window looks it up, and you can scroll through the list of available words on the left until you find the one you want. A 'Previous' button steps back through the words you have found so far, and a 'Root' button takes you back to your initial word.

Conclusions

I have always found the Desktop Thesaurus very convenient and easy to use, and the addition of antonyms is certainly worth having. WordWorks is every bit as good in its rôle of thesaurus, but it does not display any antonyms. In fact, for a straight thesaurus package, I slightly prefer Desktop Thesaurus to WordWorks: its display is a bit easier to use at a glance (with the helpful labels to the left of the synonyms and antonyms), and it operates on the hot key method which I prefer. However, there is, of course, no associated dictionary with meanings, and the text included is not from an 'official' reference book.

As an overall product, WordWorks itself is of course first class, and I think it has a great many potential uses above and beyond its current scope of dictionary, thesaurus and help system. I certainly enjoy having an electronic dictionary available at my fingertips, and I hope that its potential for presenting all kinds of references, including illustrations, is exploited to the full in the future.

Before WordWorks came out, I had expected to be looking at two similar products, but in fact they are completely different. Desktop Thesaurus is just a thesaurus, but a particularly easy-to-use one, whereas WordWorks (the name says it all) is a hypertext system to beat off all comers. If I had to choose between the two I would go for WordWorks but, as a thesaurus, Desktop Thesaurus is extremely convenient to use, is directly supported by several applications, and I wouldn't want to be without it. Its new antonym display is also handy. I'm just glad I've got both!

Information

WordWorks costs £39 +VAT from Computer Concepts (£43 through Archive). It is also bundled free with Impression Style (£99 +VAT or £107 through Archive), and the Impression to Impression Style upgrade (£29 +VAT from CC). **Desktop Thesaurus** costs £19 +£1.70 p&p +VAT from Risc Developments or £23 through Archive. A

PD Column

David Holden

Licenceware

You may have seen references to this 'new' method of selling software, often linked with PD libraries as if it were a modified form of Shareware. Don't be fooled – Licenceware has *nothing* to do with PD or Shareware. Indeed, the very concept is the antithesis of the Shareware principle.

The basic idea of Shareware is that potential users should not be caught in the trap set by all commercial software. There is no way that you can seriously evaluate 'normal' software *until* you have parted with your money. This usually means that unless you are prepared to repeat the exercise (and part with more money) with every similar program that is available, you become committed to the first one that you try. If you subsequently discover that it doesn't suit your purpose or has features that make it of little use, or you simply don't like it, it is most unlikely that the company that sold it to you will give you your money back!

With Shareware, you don't pay a penny until you are satisfied that the program is what you want. This has far-reaching consequences I shall enlarge upon at another time, but the most obvious is that if there are several programs that just might be suitable, you can try them all, at negligible cost, and only pay for the one you actually want.

Back to Licenceware... The idea of this is that instead of the 'try before you buy' principle of Shareware, the program is distributed by a 'licensed' Library who then pay a percentage of the price to the author. I may be missing something but that sounds *exactly* like commercial software to me. There are certain advantages – the program will be sold at a very low price because the distribution costs are so low and because it will normally be a simple disc with no fancy packaging and advertising overhead – but really it is just budget commercial software. The only connection with PD or Shareware is that it is normally distributed through the same network but, as with most software, it's 'pay now, try later'.

Please don't misunderstand my position, I have nothing against Licenceware. In fact, I'm very much in favour of it. It's a good method of distributing low cost software, but I do object to it being linked with Shareware as if it were a variation on that system – which it clearly is not.

The origins

Licenceware, in its present form, started with Amiga and Atari PD libraries. The main reason for this is that the owners of these machines are not so sophisticated as Archimedes users (no correspondence from irate Amiga/ST owners on this, please) and often 'forget' to register for Shareware programs, especially games. The method is therefore a good way of ensuring that the programmer receives *some* reward for his work.

It has never gained a foothold in the PC world where there is so much excellent Shareware. The people who seem most eager to sing the praises of Licenceware would appear to be 'failed' Shareware authors. I accept there is some justification for Licenceware where games programs are concerned because registrations are often rather thin, but I'm not so sure that it is a good thing for more serious programs.

"Shareware doesn't work"

This is something I have been told by people who have been unsuccessful with Shareware that they have written and who, perhaps, are now trying to jump on the Licenceware bandwagon. They don't seem to realise that there are major corporations who *exist* upon Shareware – companies like Magee Enterprises, Trius and many others, most of whom are larger than any producing Archimedes software.

Since Shareware is 'try before you buy', this means that if users don't like what they are 'trying', they won't 'buy', i.e. they won't register. When Shareware programs don't seem to produce much in the way of registrations it may *not* be that users are too dishonest to register, but just that they didn't like the program. If authors cripple certain functions in an effort to 'force' users to register, this only makes the situation worse.

Good documentation and a straightforward user interface are vital because you must convince the potential user in the shortest possible time that your program is worthwhile. A commercial program has the immense advantage that the user has already paid for it and will be reluctant to give up and admit that it was a bad purchase. Even more than with other types of software, a moderately competent Shareware program that is simple to use and with good documentation will get more registrations than a really powerful program which is not so easy to 'get into'.

CIA World Map

This, with John Kortink's desktop viewing program, was reviewed in Archive 7.4 p31 and several people have asked me if I could supply a copy. As there is obviously a lot of interest, I have decided to make it this month's special. offer, despite its huge size. When de-arc'ed, it takes about 14Mb of hard disc space. The version reviewed requires even more than this because of the installation method used but I have written my own installation program so it does not need any extra space. This also permits you to install only part of the data if you don't have enough room for the full program.

This is a fairly massive amount of data and can be supplied on six 1.6Mb discs or eleven 800Kb discs. My 'special offer' price to Archive readers will be £7.50 for the 1.6Mb version or £9 on 800Kb discs.

As regular readers will be aware, I usually insist that these offers are for the period covered by that issue of the magazine only and I will not accept requests for 'back issues'. However, because not everyone will be interested in the CIA World Map and because the offer I made in the January issue has proved quite popular, I shall extend it for the period of this issue as well. Another reason for this extension is because, as you may remember, this offer was for either two 800Kb discs or one 1.6Mb disc containing versions of all six winning programs in the APDL/Archive competition. As all 'profits' go towards extra payments for other worthy entries and prizes for the next competition, I am quite happy to extend it.

A special thanks to the many people who sent more than the £2 requested for these discs and asked that I add the surplus to this fund. You can contact me at 39 Knighton Park Road, Sydenham, London, SE26 5RN. A

ArcSimp – Electronic Simulation

Ian Williamson

This article is about an unusual application: a simulation program for the Acorn Archimedes, written by Mijas Software. It is available in two basic versions: analogue and digital, and also as mixed analogue/digital. It is available at two levels of size and complexity: Education/Hobby and Professional.

ArcSimp Analogue can be used to simulate physical phenomena, mechanical and electrical, and thus enable the study of control systems, demonstrate the laws of mechanics, and display mathematical functions. ArcSimp Digital can be used to study logic gates and simple digital controls. With suitable I/O hardware ArcSimp can be used to control models and other systems and display external events.

As an electronics engineer, I believe there is a very great need for good, or indeed any, circuit analysis programs to run on the Archimedes. (I used to use a very good program, Analyser II, which could run on a BBC Model B, but that was not supported, or translated to the Archimedes, as Number One Systems have shifted their allegiance to the PC.) Thus I have been on the lookout for suitable electronic circuit analysis programs for some time, and I am interested to see whether Richard Torrens' Electronic CAD series evolves beyond PCB layout.

(In the meantime, we have received a review by Bevis Peters of OakLogic, a digital simulation program – see page 55. Ed.)

Having said that, I should point out at this stage that ArcSimp is neither an analysis nor synthesis program for electronic circuits. It does not start at the component level (transistors, resistors, capacitors etc), but starts at the "black box" level (gain blocks, gates, integrators etc) and calculates the behaviour of the model in the time domain, not the frequency domain. Whilst it may be considered that the model is somewhat idealised, that is to some extent true of even the most powerful analysis programs (e.g. Super-Compact, Spice), and the skill of the modeller is to construct a sufficiently realistic model by incorporating stray parasitics, non-linearities etc. Nevertheless, ArcSimp is a very powerful and flexible simulation program that can give a valuable insight into what is happening in a system, and I regard it as an important addition to the Archimedes applications.

Versions reviewed

Educational/Hobby Digital Gate Simulator, version 3.01, 1st Nov 1993. This is the Digital Only version: maximum number of functions/gates 50.

Professional Analogue Simulator, version 3.01, 1st Nov 1993. This is the most comprehensive version. Supposedly, the Professional version has no limit to the number of function blocks/gates other than the computer memory but according to the Info menu, the limit was set at 60 functions and 30 graphics – this limit can be changed by editing the last line of the !Run file. The Digital Gate option had been added, and the User Function option was available.

Educational/Hobby Analogue Simulator, version 3.05, 30th Dec 1993. This version supports maximum number of 50 functions and 30 graphics. The Digital Gate option had been added. This copy was sent to me by Mijas after I had made a number of criticisms of version 3.01, and it incorporated some of my suggestions.

ArcSimp is RISC OS compliant and runs under RISC OS2 or 3 on any Archimedes with 1Mb of RAM, although it was run on an A420 with ARM 3 and 4Mb RAM for the purposes of this review. As it happens, my Archimedes is also fitted with the new Acorn FPA chip, but with the simple models I ran, I was not able to determine whether this made any difference to the running of ArcSimp, which has 64 bit floating point accuracy and uses a well-proven integration algorithm.

Functional blocks available

The Digital version has two and three input AND, NAND, OR, NOR and XOR gates, and a NOT gate. CMOS and TTL gate types are provided: you can select either type for the whole simulation from the iconbar menu but you cannot mix types within a simulation. I think the digital gate types should be extended to include ECL. Furthermore, I think you should be able to mix gate types, because that can happen in a real system, but it would mean that you would have to select the gate type for every gate, so perhaps that ought to be a feature of the Professional version. Any of the ArcSimp analogue blocks can be included and a number of these are provided: sine and random function generators, summer, delay, time constant. Two types of input and output blocks are provided: Boolean function, type boolf, which change between logic 0 and logic 1, and true input and output blocks which read and write data and thus enable communication with other programs and the real world.

The Analogue version has 36 functions – too many to list here. Input and output function are also provided to enable communication with other programs. The list of available functions will be extended as requested by users who will receive a free upgrade when their suggestion is incorporated. My suggestions are...:

Attenuator: basically a gain block with gain less than 1. Incidentally, it would be useful to have the option to define some of the amplitude parameters in dBs rather than numerical values. Peak Envelope Detector and Phase Sensitive Detector: these would be useful for plotting the amplitude and phase versus frequency of a system (Bode plot). Phase Shifter: phase angle of sine waves can be advanced or retarded by a phase shifter. This is similar to Delay function except that the delay can only be positive – if you try a negative delay, you will get an error message. Frequency Discriminator: output signal proportional to the frequency of a sine wave. This is

the converse of function Vsine. This block would be useful to model an FM receiver.

I think the logic gates are idealised: they are quite adequate for an educational application to illustrate the operation of logic systems, but logic gates in the real world respond after a finite delay time and have an output rise time. Fortunately, Mijas have been working on this but it will be limited to the Professional version.

With a little ingenuity, most of the above functions could be realised by combining a number of existing function blocks, which leads me to my next suggestion. I think it would be useful if a group of functions/gates could be enclosed in a dotted box, given a suitable name, saved and then merged into another simulation. This could save a lot of time in constructing complex models. [After I had written this review, Mijas sent me a beta version of an enhanced ArcSimp which enabled simulation models to be merged.]

It would be particularly useful to be able to represent such a group by a "black box" with the same number of ports and add it to a library of functions, i.e. the ArcSimp Tools window. The problem with this suggestion is that four copies of the black box would have to be added to the !ArcSimp.Sprites file to enable it to be rotated. Alternatively, the Rotate option could be disabled for that black box: that is a restriction I would willingly accept.

The User Function of the Professional version enables users who have copies of Acorn's Desktop C and FormEd, and are fluent in C to add their own functions. I am not, and am not able to comment on this option, but I have been inspired to buy a book on C.

Starting ArcSimp

Load ArcSimp in the usual way. When you click on the icon on the iconbar, this opens the ArcSimp scrollable simulation window and Tools window, together a licence message which lists the purchaser's name and address, and the Registration Number. This seems to me to be a good method of making software piracy more difficult (or at least conspicuous every time the program is run) without imposing the dreadful inconvenience of a dongle.

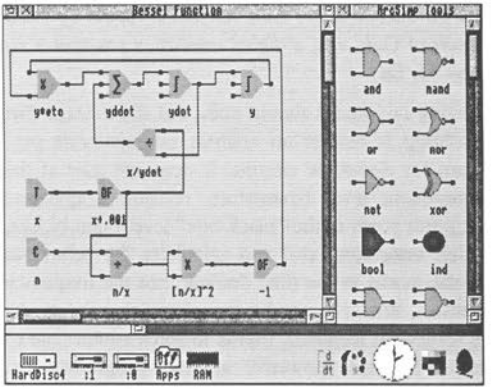


Figure 1: ArcSimp Simulation diagram and Tools windows.

A new simulation model can be created by dragging functional blocks from the Tools window and connected as described later, or an existing simulation can be found in a Workfile Directory, e.g. <ArcSimp$Dir>.examples.bessel (see below). Simulation files are loaded by dragging the green file icon onto the ArcSimp icon on the iconbar, nothing happens if you drag the simulation file icon onto the simulation window. I found that a little confusing as that is what I would have done intuitively. Alternatively, you can double click on any simulation file, but this is confusing because it always creates a new copy of the ArcSimp program.

Constructing a simulation model

A new simulation model can be constructed by dragging functional blocks from the Tools window into the ArcSimp window. A functional block can be repositioned by dragging it around the window with the mouse whilst holding down <adjust>. If you use <select>, the functional block will be copied rather than moved.

Each function block has 'blobs' to represent the input or output ports, and these function blocks are connected to one another by clicking with <select> from an 'output blob' and dragging an orange dotted 'Rubber-band' all the way to an 'input blob'. When you let go, a solid black connection line appears, made up of rectilinear segments. The connection line can also be drawn backwards, i.e. from input to output. If you let go before a connection is made, the partly completed line will remain dotted, and

you can either start again, or click on the unfinished end and start another segment of the connection. This is a sensible feature and enables you to work around and avoid other blocks, or make a feedback connection.

ArcSimp enables you to rotate a function block in order to produce a tidy diagram. To do this, you have to click with <menu> on top of the function block and then click on "Rotate" with either <select> or <adjust>; if you use <adjust> the Menu will still cover the function block but "Rotate" and other options will be greyed out. I found it irritating not being able to see the block as it rotated (it rotates clockwise by the way), especially when having to repeat the whole process to turn the icon by 180 or 270°. I would have preferred to be able to highlight the block and then carry out the operation using <select> or <adjust> in the usual way. [This has now been dramatically improved.]

The manual points out that blocks can be rotated after connections have been made and that they stay connected, but warns that they can get a bit tangled! I suppose some problems should be expected since it is difficult to anticipate all the possible combinations and the connection path has to be pinned down somehow, but I it needs a rather more prominent warning in the manual than "get a bit tangled!" If you do get your diagram into a tangle, just draw a new connection path using a better route and it will automatically replace the old one – this is a very convenient feature.

Running the simulation

The parameters for a function block are set by clicking <menu> over its icon, highlighting Data and moving onto the submenu, which is a window appropriate to the type of function or gate. It has a number of writable icons which enable you to change its name and select various parameters and values, e.g. amplitude, phase, frequency, gain, time constant etc. These parameters can be set whilst you are constructing the simulation model, or changed later. I have even been able to change parameters while the model is running, although I could find no mention of that in the manual. The manual does indicate that you can pause a simulation, save it and restart from the point at which it was paused in order to be able to introduce a number of disturbances without having to wait for the stabilisation period that some simulations may need.

When you start the simulation, ArcSimp checks that the data you have entered is suitable, allocates a system number to all the function blocks and then works out the order in which function blocks will be called. It follows an information path from the output of one block to the input of the next and gives appropriate messages if there are any errors present, e.g. "Sort error at function block <name> input n", "No path to function block <name>".

When the simulation is accepted as valid, ArcSimp displays the Run Data submenu. This submenu enables you to give a title and change some of the run time parameters. There are six coloured bands, which are actually writable icons, into which you write the name of the parameter that you wish to display in that colour.

Simulations can also be run in real time, but only if they would normally run faster than real time. It is possible that other programs will slow ArcSimp down and prevent it from running in real time. If that happens, the real time indicator flickers or is extinguished, so stop and quit any unwanted tasks. Real time operation is only likely to be required if ArcSimp is controlling an external system.

Graphics

A Graphics window can be opened from the ArcSimp main menu. A two dimensional representation of a physical object can be drawn by dragging objects from a graphics Tools window and creates a working diagram of the real world. Connections can be made from any connection point to any other object, the x and y positions of parts of this diagram can be linked to the numerical output of the simulation. A few interesting examples are included. This option is not available on the Digital only version.

Documentation

The documentation, presented in A5 format, is clear and concise. There are different manuals for the analogue and digital versions. The manual for the analogue version is the more comprehensive, and includes half page detailed definition of all 36 functions provided. The manual for the digital version is a little brief – it is adequate for the gates provided but gives no information about the analogue blocks.

Conclusions

Despite the niggles mentioned in this review, it should come as no surprise that I am very impressed with ArcSimp. It was listed in the education category under 'Review software received' in Archive, and will fill this role admirably provided care is taken to avoid getting tangled diagrams. ArcSimp will also be useful to the practising electronics engineer to model systems, but not for circuit analysis. What about it, Mijas?

ArcSimp is available from Mijas in a number of different versions at prices that I regard as very good value for money.

Education/Hobby – Analogue	£35
Education/Hobby – Digital	£35
Education/Hobby – Analogue/digital	£55
Professional – Analogue	£85
Professional – Analogue/digital	£105

My view is that the Digital-only version is likely to be the least useful, since the analogue version has many more functions which can be used to simulate a vast range of physical phenomena. It is well worth paying an extra £20 for the analogue/digital version. Furthermore, I suspect that if you buy the Education/Hobby version and start using it seriously, you will want to upgrade to the Professional version before long.

Post Script

My experience whilst doing this review is that Mijas are very receptive to suggestions and, if improvements are possible, they are made quickly. For example, I sent a draft copy of this review to Mijas, and I was very pleased to receive a copy of ArcSimp version 3.10 beta that implements many of the suggestions I had made. As this review is long enough already, I will not describe the changes here, except to say that my major criticisms concerning the connection paths and the rotation of function blocks have been addressed, and the merging of simulation models is now possible. In the short time I have had to examine them, my impression is that all the improvements appear to be very well thought out, and greatly enhance ArcSimp. If Paul can spare the space in a future issue, I would happily write a follow-up review to describe these improvements, and maybe even write (or coordinate) an occasional series describing the use of ArcSimp. A

PCB Layout Software

Richard Torrens

I have already written (in Archive 7.4 p21) about circuit diagrams but PCB layout is a different kettle of fish. Although there are obvious ties (indeed a 1 to 1 correspondence) between a circuit diagram and the actual copper layout, the latter is never confined merely to horizontal and vertical lines. Diagonal lines are very common. Also, whereas a line may be straight on paper, in copper it has to negotiate other components, so it may twist and turn across the board. Vector would be fine for small boards, but will get progressively more difficult to handle as the complexity increases. I have not actually used Vector for layout yet because of the complexity and because I have been happily using LinTrack.

LinTrack is an example of a simple program, dedicated to a single job and it does that job well although it is not much good at any other jobs. LinTrack started life on the BBC, so it had to be simple. Unfortunately, it did not develop and, because of the lack of major maintenance, it now looks 'long in the tooth'. I have an Archimedes version, running as an application from the desktop, but it is single-tasking. LinTrack was written for Linear Graphics who made pen plotters, so naturally it outputs only to a pen plotter – a severe limitation. Although I have a plotter, my problems with LinTrack started with RISC OS 3.1: plotting is now effectively impossible because, for some reason, there is a pause of perhaps ¼ second after every pass of the pen. This increases the plotting times so that a plot which used to take 2 hours can now take 6 hours. It is not practical to keep an ink pen unclogged for this duration! I am now on the look out for another program to take over.

As far as commercial board production is concerned, there is no problem since Peter Ward of Linear Graphics supplied me with a program they

had written for the DOS version of LinTrack to generate a Gerber format file. Gerber is the file format preferred by commercial photo-plotting bureaux. I had to modify the program supplied by Linear Graphics, but using it as a model and armed with a DOS PD program called GCPrevue, I wrote a new Basic program to do the conversion. It works well.

GCPrevue is a DOS program for examining Gerber and HPGL files and it works under the PC Emulator, albeit slowly.

Another reason why I have been slow in changing from LinTrack is that I have a lot of data in LinTrack format so a prerequisite of a new program is that I should be able to transfer LinTrack data across.

Design rules

This brings us neatly into the area of design rules. The more a computer program has to do, the more rules it must have to do it. An auto-routing designer will need many more rules than an elementary program. On the other hand, if I am doing a computer-assisted design, I do not want the computer to dictate to me. I am the designer and I resent the computer programmer telling me what I can and cannot do or making decisions as to what looks good and what does not. By all means have design preferences, but I should be able to switch them off if I wish. A demo program which tells me "you can't do that" gets thrown away. Design rules are useful to computers, computer programmers and beginners learning about PCB layout. They are not useful to a skilled designer who knows when to break them.

Here are a couple of common design rules: (1) "Tracks must be orthogonal or diagonal (horizontal, vertical or 45°)." This is not true – tracks can be at any angle I care to put them. They can also be round, straight, areas or lines. All will work most of the time. It is a useful rule, certainly for the less-skilled layout artists, to keep tracks orthogonal since nothing looks worse than higgledy-piggledy tracks. However, orthogonality is a rule for the computer's benefit, not for the user and it must be optional.

(2) "Tracks must start on a pad." This is not true either – some designs may look better is this if so, but some boards just can't be made like this. A lot of my design would not be possible with this rule, so the software is a non-starter if I cannot turn this off.

There are many other design rules that a package may have but these are only likely to become visible as the program gets used. My question is – can I break the rules? Lintrack is a 'manual' package, virtually without rules, so I can do what I want except that the program is simple so it has few abilities. This means that, as well as not having rules to break, I also have to work around the things it won't do.

Output options

Any software must be able to interface to the real world. There are essentially two occasions that output is required; one is for prototype purposes when a life-size master is required for contact printing onto photo-sensitive board and the second is for commercial production of boards. I shall consider DIY boards first.

Pen plotter – Early programs often output to a pen plotter. A latex-based black ink (Staedtler 747-TL9) is used in a tungsten-carbide tipped plotter pen, plotting onto polyester film. This can give a good output but may take many hours in plotting. The plotter has to be attended whilst it is running as this ink clogs in the pen very quickly. The software must be correctly written – too much time off the paper, not plotting, causes clogging. Also, putting the pen down onto an already plotted area can cause the ink to chip off, again clogging the pen. Plotters are time-consuming and temperamental and, speaking as one who has used a pen plotter for many years, are to be avoided.

Dot matrix printer – This is not a method I have ever used but a new ribbon can give a good enough output onto printer paper. The trick is to oil the paper after printing: the paper becomes translucent after oiling and can be used for a 1:1 contact print.

Inkjet printers – The main trouble I suspect, is paper stretch as a PCB is likely to use a lot of dense ink. Dense ink means wet, crinkly, stretched paper. Paper is a poor medium because it changes size with humidity. *(Some inkjets can output onto acetate. Has anyone tried that for PCB layout? Ed.)*

Laser printer – This is much the best method nowadays. Lasers give a dense, near-photographic quality print and are ideal. A laser will print onto

polyester film which is ideal. Lasers do tend to stretch some printing media because of the heat involved in fusing the toner but this is a small problem.

PostScript files on disc can be sent to a commercial bureau. This seems to be the cheapest option. However, for highly accurate work, the PCB photo-plotting bureaux I have talked to (who cannot use PostScript yet) claim that laser printing is not accurate enough for some of the work they have to do.

Gerber files can be sent on disc to a photo-plotting bureau. Photo-plotters are immensely accurate and this will give the finest quality of finished artwork. There are not many Gerber file converters available but I have one for LinTrack files and if anyone wants a copy, please send me a disc.

HPGL files can also be sent to a photo-plotting bureau. Most photo-plotters can accept HPGL input as easily as Gerber files. However, few programs give an accurate HPGL file: the file that they give is almost certainly designed for an ink plotter where the ink spreads. Send one of these files to a plotter bureau and you are likely to get a photographic master riddled with holes although it was perfectly acceptable on a pen plotter. HPGL also takes a long time to plot, compared to a Gerber file so is not liked.

The contenders

The programs I know about and hope to be looking at are: Draw, LinTrack, OakPCB, ArcPCB, CadMust, Vector, an unpublished program by Mike Harrison and RiscCAD.

To do a proper in-depth review of six or seven programs is virtually impossible since it would require the reviewer to use the programs fully. This is one of the problems with reviews: if the package is sophisticated, the reviewer needs to review the package whilst learning it so that he can give not only a beginner's viewpoint but also that of an experienced user. This is a tall order but is the direction I hope to follow, though I am restricted by the fact that I need to produce products to sell so my design work has to be productive.

LinTrack I know very well – perhaps too well as this will inevitably lend a bias to my comments. OakPCB I have been using for six months. ArcPCB I do not know very well so shall tend to omit it. CadMust has just arrived on my desk, looking very glossy and exciting. Vector is not a PCB layout program but it appears to be better than some of the 'dedicated' PCB layout programs. The offering by Mike Harrison is one written for his own use, not for public consumption, which he has given me. If I like it, maybe he can be convinced to release it for general use. His objection is that it lacks documentation, is not RISC OS compliant and, being written for his own use, has an individual and idiosyncratic user interface. However, I don't find this off-putting as this is also a fault with some of the commercial competition. RiscCAD I add as I have just found out that the author is an electronic designer, very much into PCB layout.

LinTrack

LinTrack is a simple, manual style routing program based on the 'pads & tapes' manual design methods. Anything you can do with pads and tapes, you can do with LinTrack. The limitation is that it only has eight pad sizes, six round (50, 75, 100, 125, 150 and 200mil) and two elongated pads, 50×100mil and 75×150mil. It also has eight track widths: 15, 25, 50, 75, 10, 125, 150 and 200mil. All tracks are straight (as the file format only specifies start point, end point and parameters such as layer, width, etc.) The program is not Desktop compliant as it pre-dates RISC OS. Layout and editing are all simple, mouse or keyboard controlled and even a rank beginner will find it easy to use.

The problem with LinTrack, apart from the limitations of its simplicity, are due to its output options which are "anything you want as long as it's a plotter". There is now also an option to transport LinTrack files to Vector, but more of this next month.

Draw

I include Draw in this list only because you all have it. You could use Draw, but it would be very difficult to use for anything but the simplest boards. I have already discussed Draw's shortcomings but these are not totally insuperable. OakPCB is a Draw-style program and so is Vector. If I were writing a CAD program, I would not use Draw as a standard. It is a drawing program, not a design program (or presumably Acorn would have called it

Design). However, Draw is free with the computer which, if I were a programmer, would not make me think that it is the standard I have to follow. Rather, I would see it as the standard I have to surpass if I am to sell programs. Vector uses Draw as a starting point and improves it a lot.

OakPCB

I purchased this as an upgrade from LinTrack. If it had been as good as I required, I would not now be doing this series, for in writing this series, I am really trying to find a satisfactory solution to my own requirements. OakPCB is Draw-based and I have already detailed the problems with such programs. Draw-type programs are fine for simple, orthogonal files (without diagonals) but this does not include PCBs with a lot of tracks.

I do not propose to go into details of OakPCB's shortcomings. Rather I would like to tell you the story of my dealings with Oak.

(At this point, I wave the editor's magic delete button over Richard's extensive comments about his dealings with Oak Solutions – sorry, Richard! I have been acting as 'pig-in-the-middle' and feel that an airing of their disagreements would not really be of benefit to anyone. Richard is convinced that OakPCB, without modification, is not going to meet his needs and Oak Solutions are equally convinced that their product could do the job if Richard were prepared to work in a different way. They say they have a large number of satisfied users, so if you are using OakPCB for 'non-trivial' PCB manufacture – say 25 components or more – and could give us your view, do let us know. Ed.)

Enough said about Oak. I don't intend to go into any detail unless feedback indicates that this is what you want. Suffice it to say that I am now busy transferring all my work out of OakPCB into Vector. Keep an eye on the 'for sale' ads if you want a second hand copy of OakPCB!

(We have just received a brief review of OakPCB from Bevis Peters to whom we sent the original review copy some time ago. I will publish it below in the hope that Bevis' views will contribute to the debate. Ed.)

ArcPCB

I have a copy of ArcPCB (1.4) which we bought several years ago. It looked OK – but I saw no reason to change from LinTrack then. Any comments I make will be based on an old version – which did not seem fair to Silicon Vision. I therefore wrote to them as soon as I knew Paul was going to publish my ramblings, pointing this out and asking them if they would like me to mention their latest version.

They have not answered my letter but simply sent me a printed sheet telling me how I could buy an upgrade to my existing version. Nor did they answer the two telephone messages I left. However, Paul managed to get a response from Dr Yunas Nadiadi, Silicon Vision's MD, who wrote to say that they were "not interested in releasing ArcPCB v5.1 for review at this stage" – although he did not give any reason for his decision. Dr Nadiadi knows that we would like to try his product and report to the Archive readers, so I hope that he will soon feel able to release a copy for review. *(Or is there anyone out there using ArcPCB v5.1 who would like to give us their comments? Ed.)*

CADMust

I had a demo disc of this when it first came out but I could not get into the program. Since then they have upgraded and enhanced it, so it was with some excitement that I opened the impressive-looking package. USArc have obviously put a lot of trouble into preparing CADMust. It is full of facilities and probably has all the bells and whistles that anyone can imagine or ever want.

I spent three days trying to get into and use the program but without success. I'm only a poor electronic designer who's been designing and producing PCBs for 25 years and am now trying to run my own business and produce simple analogue circuit boards which would have been relatively easy (if time consuming) by means of tape and pad layout. I'm so unsophisticated that I cannot find out how to use CADMust. I cannot even find out whether I can put a pad on one layer only: the manual doesn't say. I've even tried placing a pad and printing it but all I get is a blank sheet of paper.

Now this is really frustrating – I want to use this program. I need a program, OakPCB is not for me. I want CADMust to work out. I've spoken to Wouter Kolkman at Lindis (the UK agents) who has tried to

be really helpful. I've also spoken on previous occasions to USArc in the Netherlands – they too are very helpful.

What I'm trying to do is not complicated, so surely any good program should be able to do a simple double-sided board, without any through-plating. Surely it must be simple to do a simple board? Even a complicated program must allow you to do simple task, mustn't it?

The manual is (probably) very comprehensive but I do not understand the methods that CADMust uses for its work. I do not understand why I need to do things the way they say, rather than the way I want and I don't understand the philosophy behind CADMust. I know that most users of software want to use it *without* understanding anything about it but it is surely true that someone who understands a tool (be it a screwdriver, a computer or a software package) can use it better and be more inventive with it than someone who does not understand it.

USArc's manual is possibly good for someone who has been trained on a similar package and has been a computer PCB designer for many years. But is there a similar package anywhere? Are not skilled computer layout artists already using their favourite package? USArc must attract new, inexperienced learners to their software by making is easy to use and making the manual easy to read.

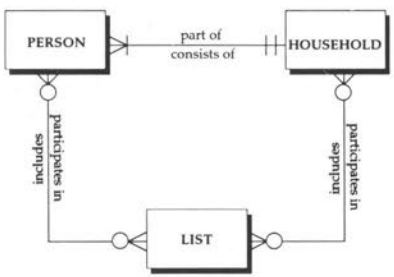
Vector

I have now taken the plunge and purchased a copy of Vector. It does the job of PCB design (for which it was never intended) so well that next month's column is devoted to Vector for PCB work. One measure of a good program could be how well it does a job for which it was not designed... A

Relational Database Design – Part 2

Keith Underdown

Last month, I began the development of a Data Model to describe a relational database holding names and addresses. We concluded that there are at least three entities that we need to use to describe all the information that we hold in an Address Book. The Entity-Relationship Diagram that I used to describe that model is shown below:



The conventions used in this diagram are repeated in the box at the end of the article for new readers.

In this article, I want to look at LIST in more detail in order to see how to resolve the "many-to-many" relationships that it has with PERSON and HOUSEHOLD.

What is a List?

We need two many-to-many relationships to describe what we want to do – to allow a PERSON or HOUSEHOLD to be involved in more than one LIST and a LIST to involve more than one PERSON or HOUSEHOLD. How can we eliminate these complications and thus eliminate the arbitrary restrictions that we would otherwise have to have? For the moment, I will look only at the relationship between HOUSEHOLD and LIST. The relationship between PERSON and LIST – and any other many-to-many relationship – can be resolved in the same way.

What is a LIST – what does it consist of? It is fairly easy to see that a LIST has MEMBERS. We can say that:
"A HOUSEHOLD may be a MEMBER of none, one or many LISTS." and "A LIST has many MEMBERS."

This can be modelled as in the next diagram:

This can be read as:
A LIST has none or many LIST MEMBERS

A LIST MEMBER belongs to one and only one LIST

A LIST MEMBER refers to one and only one HOUSEHOLD

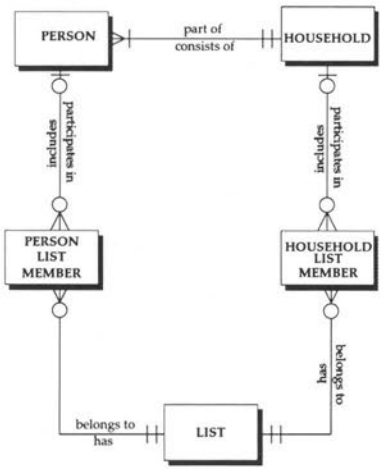
A HOUSEHOLD may be none or many LIST MEMBERS

There is now no restriction on the number of LISTS in which a HOUSEHOLD can be included and no restriction on the number of LISTS we can create (apart from the size of our disc). We need to say that a LIST can have no members because, obviously, we need to be able to create a LIST before we can put any members in it. On the other hand, both the relevant LIST and HOUSEHOLD must exist before we can create a LIST MEMBER.

Resolving many-to-many relationships

This is a general technique for resolving many-to-many relationships. Break the relationship and put a new entity between the original pair. Then put a zero-to-many crowsfoot at the new entity end of the relationship and a one-to-one or zero-to-one crowsfoot at the ends next to the two original entities, depending on the optionality of the many-to-many relationship. It is sometimes difficult to work out what the new box actually represents but it should always be possible. There will be more examples as we go along.

Applying this technique to both kinds of LIST we can refine of our model still further, although we still have not got to the stage when we can implement our database. Our Entity-Relationship Diagram now looks like this:



We now need to consider what information we need to hold in each entity – to define its attributes. In database terms, we must decide what fields we need to have in each table and how we should hold the data.

Let us take LIST first of all. It is easy to deal with and will cover an absolutely essential point that will apply to all other entities.

What do we need to know about a list? Simply, what it is for – so we need a description. Thus we need:

LIST Attributes:

List Description: A free format description of what the list is to be used for.
Field Type: String.

In order to go any further, we need to understand how we use fields in tables to indicate that there is a relationship between them.

Unique identifier

The answer lies in something that I have not seen discussed in any article in the Archimedes press and that is not covered adequately in the SQuirreL manual. It is this:

Every Entity must have a field which uniquely identifies every instance of the entity.

In other words, every entity must have an attribute that can be used to differentiate between the various members of the population. If we turn to HOUSEHOLD for a moment, it should be obvious that we will need a Surname field. However, it will not be unique. My address book has three Underdown HOUSEHOLDS in it. In order to avoid ambiguity, we need something to act as the "*Unique Identifier*" or "*Primary Key*". Sometimes there is an attribute that naturally fulfils this purpose but more often than not, an arbitrary key needs to be assigned. It must be determined when an entry is created and never changed during the lifetime of the entity.

If we were building a database of elements then a natural key would be Atomic Number (12 => Carbon) or Chemical Symbol (C => Carbon). Sorting on Atomic Number is important and Primary Keys are often the primary index into the table so that would be the one to use here. What are we going to use for our LISTS and HOUSEHOLDS?

The answer is that we need to invent an arbitrary identifier that is guaranteed to be unique. Here we come to the two features of the recent upgrade to SQuirreL that make it worth getting. It introduces the ability to label a field as *unique* – it will not save a record if the value of such afield already occurs in another entry. Secondly, it offers the ability to generate a default value that is one more than the current highest in the table (*Serial*). I was not going to bother upgrading until I read in Digital Services' literature that these facilities would become available. None of the articles about the release in the press thought this important enough to mention! Even Digital Services themselves say only that it is useful for counting the records in a table! It is *central* to implementing a truly relational database.

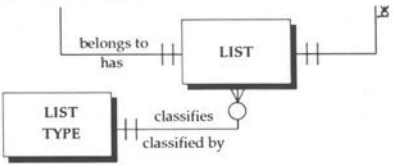
Every table must have at least one field that is *unique*. A suitable way of generating this in SQuirreL is to use the *Default Serial* trick. Note that if you import records from another package, perhaps using CSV, then you must ensure that the Unique Identifier is supplied. SQuirreL does not supply the default in this case.

LIST thus becomes:

List Identifier: A arbitrary identifier.
Field Type: Integer (serial, unique).
List Description: A free format description of what the list is to be used for.
Field Type: String.

SQuirreL (and other Archimedes databases) has an advantage over mainframe databases in its ability to handle complex objects like application files and variable length text fields. **List Description** here could be a variable length string.

There is another attribute required by LIST in order to be able to distinguish between PERSON-based lists and HOUSEHOLD-based lists. This is **List Type** – in this case it could be a Boolean field but that might turn out to be restrictive, so integer or string would be better. Another alternative would be to use a list of allowed values in SQuirreL's validation dialogue. We have, in fact, identified another entity – LIST TYPE – that we use to decide what kind of LIST we are dealing with. This is an instance of a special kind of entity called a classifying entity. Its relationship with LIST is as follows:



In this case, we would be justified in using a validation list with just two values because a new value would imply a change to our Data Model. This would automatically require other changes to the database structures and so could not be done by our users. A single character string taking the values "P" and "H" would be better than an integer as its meaning would be more obvious. There will not be a table in our database corresponding to this entity, it is implied by the validation rules.

We have fully defined List. It has three attributes: **List Identifier, List Type** and **List Description.** The order is not particularly important but it is conventional to put the Unique Identifier and references to classifying entities first.

We will take HOUSEHOLD LIST MEMBER next as it will help us to understand how we implement a relationship. (Incidentally, a relational database is so-called, not because it contains relationships, but because tables are an implementation of a mathematical concept called a "relation".)

I will refer to the entity as LIST MEMBER for the moment, to stand for both types.

What does the entity do for us? It tells us that HOUSEHOLD (or PERSON) X is a member of LIST Y so it must contain a reference to both a HOUSEHOLD or PERSON instance and a LIST instance.

Foreign keys

The only reliable way to refer to a given instance of any entity is to use its unique identifier. This suggests that LIST MEMBER will have two attributes: one for each relationship involving it. This is a general rule: where an entity is involved in a 1(or 0)-to-many relationship at the "many" end, it will have an attribute holding the unique identifier of the entity at the other end of the relationship. This type of field is known as a *foreign key*.

LIST MEMBER thus becomes:

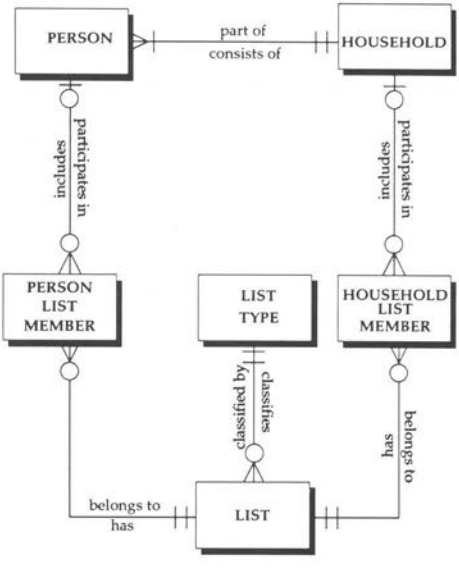
List Identifier: The identifier of the LIST to which the member belongs.

Field Type: Integer (the same as the List Identifier in LIST). However, this time it must be neither unique nor serial. If it were unique, every LIST could only have one member and serial is not a sensible default. I have not investigated SQuirreL's ability to default to a system variable but this could be a useful technique. Setting the variable to the appropriate value would give a default that identified the list you were setting up.

Member Identifier: The identifier of the HOUSEHOLD or PERSON that is a member of the LIST implied by **List Identifier**. Whether a HOUSEHOLD or PERSON is meant is implied by the LIST TYPE of LIST. This means that PERSON LIST MEMBERS and HOUSEHOLD LIST MEMBERS could both be held in the same table but only if the two unique identifier fields have the same type. Because this would probably complicate its use in queries and reports, I would recommend that we keep them separate. Again, this field is not unique as this would constrain each PERSON or HOUSEHOLD to be a member of only one LIST.

Compound keys

We have defined LIST MEMBER but we seem to have broken our cardinal rule – it has no unique field to act as its unique identifier. The answer to this is that the combination of **List Identifier** and **Member Identifier** will be unique. A HOUSEHOLD can only be a member of a given LIST once. In this case, we have to regard both fields as giving the unique identifier. The entity is said to have a compound key formed from these two attributes. SQuirreL does not allow us to specify this but that will not prevent us from using it.

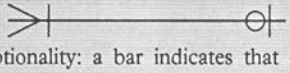


Data Modelling Definitions & Conventions

Entity: an object of interest to the problem under discussion. Represented by a rectangle in an Entity-Relationship Diagram. Equates to a table in a database.

Attribute: a property of an entity. Equates to a field in a table.

Relationship: a way in which entities are connected together that helps us to understand the problem more clearly. Represented by a line terminated at each end by a "crowsfoot" that indicates whether the relationship is mandatory or not (optionality) and how many instances of the entity at that end will be involved in the relationship (cardinality).



The inner symbol indicates the optionality: a bar indicates that every instance of the entity will be involved in the relationship at least once and a circle indicates that the entity can exist without being involved in the relationship. The outer symbol indicates the cardinality – a bar indicates that the entity will be involved in, at most, one such relationship and a trident indicates that it may be involved in an indeterminate number.

Summary

We have now explored and, I hope, understood the key concept in a relational database – the way in which relationships are implemented. On the way, we have discovered two important rules: how to resolve a many-to-many relationship and how to avoid ambiguity between similar entries in a table by ensuring that every table has a field that acts as a Unique Identifier.

We have fully defined five of our entities but we have not yet defined the two most obvious – PERSON and HOUSEHOLD. We will define them next time. More entities will appear as we delve deeper! Although an Address Book looks like a simple example, it is not. This should not surprise us as we are trying to develop hard and fast rules to handle ideas that have grown up over the centuries.

Our Entity-Relationship Diagram now looks as shown on the previous page.

I would glad to hear from anybody who has any comments on these articles and the general subject of database design. My address is: 619 Liverpool Rd., Ainsdale, Southport, PR8 3NG. A

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